Air-condensed water chillers and heat pumps YLCA/YLHA 40, 50, 60, 80, 100, 120 and 150 (R-410A)

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Technical Information

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Index

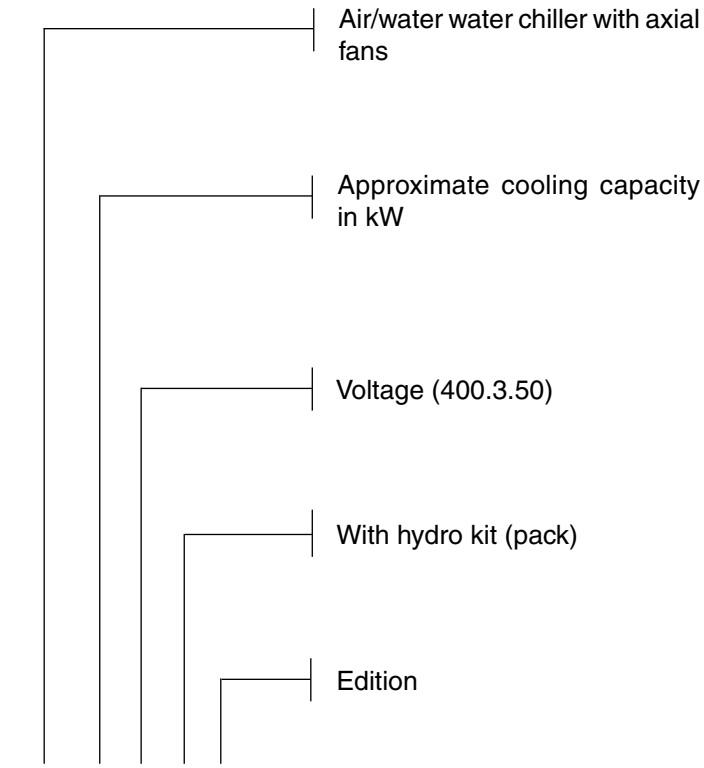
	Page
General Information	5
- Nomenclature	5
- General description	5
- Models available and capacities	5
- Features and advantages	6
Technical Specifications	6 - 7
- Accessories and options	7
- Physical data, cool only units	8
- Physical data, heat pump units	9
- Operation, cooling and hydraulic diagram YLHA 40 (cool only)	11
- Operation, cooling and hydraulic diagram YLHA 40 (heat pump)	12
- Operation, cooling and hydraulic diagram YLCA 50-80 (cool only)	13
- Operation, cooling and hydraulic diagram YLHA 50-80 (heat pump)	14
- Operation, cooling and hydraulic diagram YLCA 100, 120 and 150 (cool only)	15
- Operation, cooling and hydraulic diagram YLHA 100, 120 and 150 (heat pump)	16
- Table 1. Cooling capacities YLCA 40÷150	17
- Table 2. Cooling capacities YLCA 40÷150 (35% ethylene glycol)	18
- Table 3. Cooling capacities YLHA 40 ÷ 150	19
- Table 4. Cooling capacities YLCA 40÷150 (35% ethylene glycol)	20
- Table 5. Heating capacities YLHA 40 ÷ 150	21
- Table 6. Available pressure for hydraulic circuit YLCA/YLHA 40 ÷ 150	22
- Table 7. Pressure drop in hydraulic circuit YLCA/YLHA 40 ÷ 150	23
- Table 8. Pressure drop of filters	24
- Table 9. Correcting factors for other glycol concentrations	24
- Table 10. Sound power spectrum	24
- Table 11. Gumming coefficients	25
- Table 12. Altitude factors	25
Selection Guide (YLCA/YLHA)	25
- Necessary information	25 - 26
- Glycol selection guide (cool only units)	27 - 28
Installation Instructions	28
- Environmental protection	28
- Elimination of the unit	28
- Safety	28
- Transportation	28
- Handling	28
- Warming signs	28
- Location	29
- Fastering the unit	29
- Clearances	29
Wiring	29
- Electrical connections	29
- Rotational direction of Scroll compressors	29
- Hydraulic connections	29
- Dimensions and hydraulic connections	30 - 33
- Minimum technical clearances	34 - 35
- Wiring electrical diagrams	36 - 48
- Electrical characteristics	49
- Limits of use	49
- Prior to final approval of the installation	49
Operating Instructions μC2 YLCA/YLHA 40	50
- Description of control unit	50
- Standard components	50
- General diagram	51
- Symbols on the display	52
- Functions of control unit buttons	52
- Location of controls	53
- Parameter tables	53 - 62

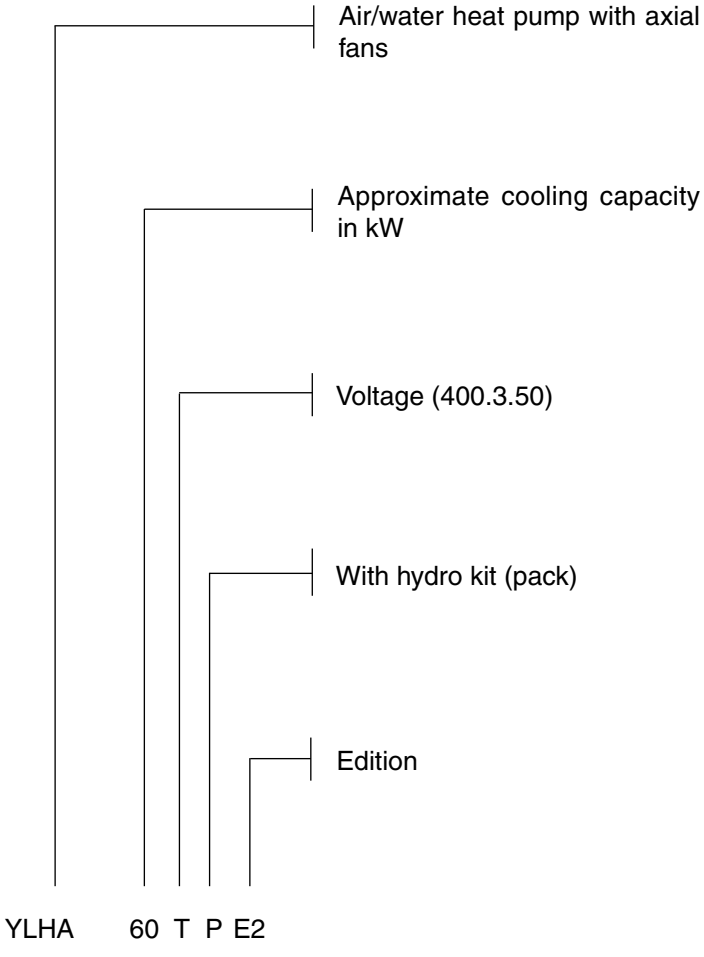
Index

	Page
- Alarms table	63
Operating Instructions μC2 YLCA 50, 60 and 80	64
- Description of control unit	64
- Standard components	64
- General diagram 50, 60 and 80	65
- Symbols on the display	66
- Functions of remote control unit buttons	66
- Location of controls	67
- Parameters tables	67 - 75
- Alarms table	76
Operating Instructions μC2 + Expansion YLCA 50, 60 and 80	77
- General diagram	78
- Symbols on the display	79
- Functions of control unit buttons	79
- Location of controls	80
- Parameter tables	80 - 89
- Alarms table	90
Operating Instructions	91
- Controller μC3 YLCA/YLHA 100, 120 and 150	91
- Keyboard-display	92
- Control μC3	92
- General diagram	93
- Pressure sensors	94
- NTC probes	94
- Commissioning	94
- Configuration of probes	94
- Antifreeze	95
- Configurtion of compressors	95
- Defrost	96
- Condensation	96
- Configuration of the machine	97
- Intake/outlets	98
- Alarms	99
- Control	99
- Alarms table	104
- Temperature/resistance characteristics of the NTC control probes	105
Accessories	106
- Remote terminal YLCA/YLHA 40, 50, 60 and 80	106 - 107
- RS485 serial line connection	108
- Remoting the keyboard-display YLCA/YLHA 100, 120 and 150	109
- Remote control unit	110 - 111
- Soft start	112 - 113

General Information

Nomenclature





General description

The YLCA/YLHA units are high-performance air-water water chillers and heat pumps using R-410A ecological refrigerant.

These units are designed for air conditioning or industrial applications that require cold or hot water. They are silent and compact units, equipped with vertical air discharge axial fans, that can be installed directly outdoors. They are available in two versions: With and without a hydro kit, which includes a buffer tank and a high head pressure pump.

The control system of these units is a specially programmed e lectronic controller to be used on air-water water chillers and heat pumps equipped with tandem compressors.

Easy to use and safe, these units precision control the water return temperature of the installation, carry out defrost cycles, modulate fan speeds and control compressor, pump and electric heater start-ups. By reading the control probes and safety elements, the controller protects the entire equipment against malfunctions. The system allows connecting the unit to a standard RS485 monitoring network. For further information, please see Operating Instructions.

The YLCA/YLHA units are made of proven quality components and manufactured in compliance with standards in force (ISO 9001 certification).

Models available and capacities

Cool only model	**YLCA 40**	**YLCA 50**	**YLCA 60**	**YLCA 80**	**YLCA 100**	**YLCA 120**	**YLCA 150**
Cooling capacity	39.6	52.1	60.5	77.6	98	119	151

Heat pump model	**YLHA 40**	**YLHA 50**	**YLHA 60**	**YLHA 80**	**YLHA 100**	**YLHA 120**	**YLHA 150**
Cooling capacity	37.8	52	60.5	72.2	96	114	145
Heating capacity	38.6	52.5	59.6	74.7	104	119.6	150

Cooling capacities in kW for 12/7°C entering/leaving water temperature, and 35°C ambient temperature.

Heating capacities in kW for 40/45°C entering/leaving water temperature, and 7°C ambient temperature.

Features and advantages

Features	Advantages
R-410A refrigerant	Does not harm the ozone layer.
Minimum dimensions	Minimum footprint.
Low height and weight	Space for installing on terraces.
Factory tested equipment	Operating quality control.
Accessibility	Easy maintenance.
Main switch	Operator safety.
Microprocessor for control and alarms	Easy and safe operation.
Manufactured to ISO 9001	High quality level.
Variable speed fan	Low noise level and condensation control.
Hydro kit	For installations with low water volume.
Connection for communications	Ideal for building management.

Technical Specifications

These units are supplied completely factory-assembled and with all refrigerant tubing and wiring ready for installation on the job site. After mounting, these units must go through an operational test with water. Refrigerant leaks will also be checked during this process.

Sheeting casing
The units are made of galvanized steel sheeting and anticorrosion nuts and bolts. Panels can be removed for access to internal components. The casing parts are painted with white RAL9001 oven-baked polymerized enamel.

Compressors
Two hermetic Scroll compressors mounted in tandem on rails and antivibratory supports are used (except for model 40, which contains one single compressor). Both compressors are connected for operation with one single cooling circuit. Start-up is carried out by two independent starters. These compressors are equipped with
mechanical elements that protect them against high operating temperatures. The sump heaters operate only when the compressor is inoperative.

Indoor heat exchanger
Comprises a stainless steel plate exchanger, adequately insulated by a layer of closed-cell elastomer foam. Includes an antifreeze heater monitored by the controller. The refrigerant side of said exchanger accepts an operating pressure of 45 bar, whereas the water side accepts 10 bar. When the unit includes a hydro kit, maximum admissible pressure on the water side is 6 bar (adjustment of the tank relief valve).

Outdoor heat exchanger
Made up of two notched aluminium blue fin coils and grooved copper tubing mechanically expanded within the fin assembly.

Fans
Of the axial and low sound level type. Equipped with single-phase motors with IP54 protection. These motors allow speed control by means of a phase cut-out shifter controlled by the unit controller. This allows unit operation at low ambient temperatures (-10°C).
On cool only units with an optional low ambient temperature kit can reach -18°C. On heat pumps, the fan will remain inoperative during defrosts.

Electric and control panel
Located at the front of the unit, and with IP44 protection. The operating and control components are factory mounted, wired and tested. The door of this control panel is equipped with a locking isolator that turns power supply off. Inside we find the contactors for compressors and the pump, the transformer, magneto-thermal protectors, controller electronic plates, speed control, connecting strip and the keyboard-display with the unit controls.

Control keyboard-display
This device is accessible through an external leak-tight plastic cover. This is an easy-to-use control with three access levels: Direct, User (password) and Factory (password). For further information, please see Operating Instructions.

Cooling circuit
The cool only unit cooling circuit includes: expansion valve, filter-dryer, liquid sight glass, high and low pressure switches, service valves for isolating the condensing unit, and Schrader valves on the high and low sides. The heat pump model also includes, in addition, a four-way valve (energized in summer cycle and during defrosts), retaining valves, a heat cycle expansion valve and a liquid tank. The suction tubing is coated with closed-cell elastomer.

Hydro kit (pack)
These units include a pack assembled with the components of a hydro kit. This assembly is located within the unit frame and does not increase the footprint of same. It includes the following components: Lined buffer tank and with an antifreeze heater, centrifugal pump, expansion vessel charged with nitrogen at 1.5 bar, relief valve set to 6 bar, water circuit

pressure gauge, two air bleed valves, filling valve and drain valve. Also includes a mesh filter for the water circuit. This filter is supplied loose for installation at the most convenient point.

Flow switch
Assures sufficient water flow when the unit is in operation.

Protecting grids
To protect the coils from possible impacts. Made of steel rods and painted with oven baked polymerized white enamel (RAL9001).

Accessories and options

Unit without hydro kit
Includes the elements described in the previously mentioned specifications, less the hydro kit (pack). The water circuit includes an air bleed valve. Connections are ready for field installation.

Two pumps
Accessory available with models 50 to 100 with hydro kit. The second pump becomes operative when the magneto-thermal protector of the first pump is activated (models 50, 60 and 80), or through the controller program (models 100, 120 and 150).

Water filter
Supplied as a standard element on units including the hydro kit (pack). Stainless steel mesh with 1 mm. diameter perforations.
Optional on units not including the hydro kit.
The warrantee of the unit will not be valid if a water filter has not been installed.

Remote control unit
Wall-mounted remote control unit with keyboard for cool/heat and ON/OFF functions. Includes power supply, alarm and cool/heat LEDs. Maximum cable length: 50 m.

Remote terminal
For total access and control of the system by means of the display and buttons. Allows selecting cool, heat and off functions. Can also modify operating parameters and monitor the system. Can be installed at a maximum distance of 1040 m.

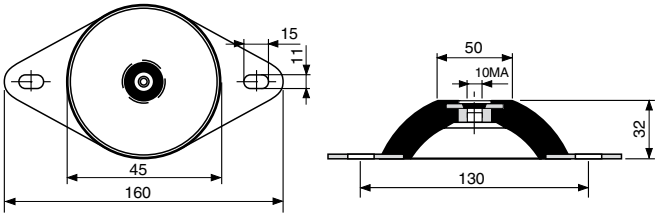
BMS connections
By means of a serial board, it is possible to connect the system to a standard RS485 monitoring network.

Low noise level units
Include anti-noise covers mounted on the compressors and sound isolating plates, covering the compressor chamber.

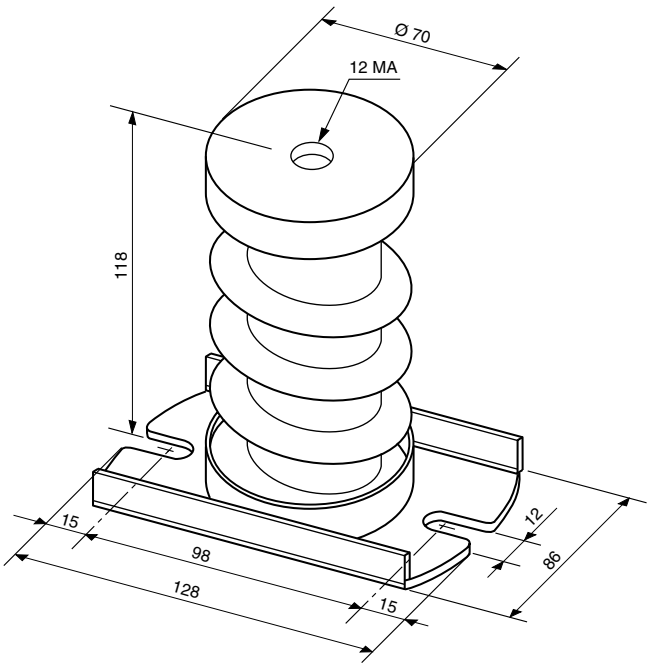
Static starter
For smooth start of the motor. Specially designed for Scroll compressors (maximum outdoor temperature: 50°C).

Antivibratory supports
Whenever necessary to reduce vibrations and noise produced by the unit to a maximum, a set of steel spring antivibratory supports can be used. These should be installed between the chassis support of the unit and the base or floor where same is to sit.
This base must be solid and dimensioned in accordance with the load to be supported.
The antivibratory support accessory for models YLCA/YLHA 40, 50 and 60 includes 4 units, whereas for models YLCA/YLHA 80, 100, 120 and 150 includes 6.
These spring supports should be distributed and fastened in the drilled holes at the base of the chiller, the location of which is detailed in the General Dimensions section.

YLCA/YLHA 40



YLCA/YLHA 50 ÷ 150



Physical data, cool only units

Characteristics		YLCA 40 T and TP	YLCA 50 T and TP	YLCA 60 T and TP	YLCA 80 T and TP	YLCA 100 T and TP	YLCA 120 T and TP	YLCA 150 T and TP
Cooling capacity	kW	39.6	52.1	60.5	77.6	98	119	151
Capacity control	%	0 - 100	50 - 100			25 - 50 - 75 - 100		
Power supply	V/ph	400.3.50						
Compressor consumption	kW	12.46	2 x 8.5	2 x 9.20	2 x 12.4	4 x 7.8	4 x 9.4	4 x 12.5
Compressor amperage	A	23.5	2 x 15.5	2 x 16.7	2 x 24.6	4 x 16	4 x 17.7	4 x 23.5
EER		3.0	2.9	3.1	2.9	2.9	2.9	2.8
No. of refrigerant circuits		1				2		
No. of compressors		1	2 (1 TANDEM)			4 (2 TANDEM)		
Compressor type		SCROLL						
Oil charge	l	3.25	2 x 3.25			4 x 3.25		
Oil type		POLYOL ESTER OIL						
Evaporating unit type		PLATES						
Nominal water flow	l/h	6 820	8 960	10 400	13 350	16 860	20 470	25 970
No. of fans		2			3	4		
Fan diameter	mm	560	630					710
Fan consumption	W	2 x 400	2 x 600		3 x 600	4 x 600		4 x 860
Fan amperage	A	2 x 1.9	2 x 2.8		3 x 2.8	4 x 2.8		4 x 3.9
Total air flow	m^3/h	12 300	18 600		27 500	36 000		48 000
Refrigerant type		R-410A						
Refrigerant charge	kg	11	13	16	25	2 x 14	2 x 16.2	2 x 21
Sound power (STD) / (LN)	dB (A)	81/76	84/78	85/80	86/82	86/82	86/82	87/83
Sound pressure at 5 m (STD) / (LN)	dB (A)	60/54	62/56	63/57	66/60	63/60	64/60	65/61
Sound pressure at 10 m (STD) / (LN)	dB (A)	54/48	56/50	57/51	60/54	57/54	58/54	59/55
Dimensions								
Length	mm	1 500	2 104		2 944	3 416		3 770
Width	mm	822	1 011		1 118	1 101		
Height	mm	1 573	1 600		1 600	2 190		2 263
Water connection, female		1 1/4"	2"			2 1/2"		
Water filter		1 1/2"	2"			2 1/2"		

Units with hydro kit (version P)

No. of pumps		1						
Available static pressure at nominal flow (without filter) (2)	kPa	115	110	160	126	190	205	192
Available static pressure at nominal flow (with filter) (3)	kPa	105	108	158	123	187	202	186
Pump consumption	W	1 035	990	1 515	1 620	2 395	3 180	3 400
Pump amperage	A	1.9	1.8	2.9	3.3	44	5.5	6.1
Unit water content	l	131	188	194	285	193	195	214
Expansion vessel volume	l	12		18		25		35
Tank capacity	l	115	170		260	152		
Relief valve setting	Bar	6						
Max. unit power supply consumption	kW	18.23	24.6	26.3	35.2	52.4	56.2	70.7
Max. unit current amperage	A	33	46.2	49.2	70.5	95.4	108	124
Start-up amperage (compressor)	A	174	118	118	174	118	118	174
Weight (1)	kg	380	580	611	785	1 220	1 286	1 503

Units without pack

Start-up amperage (compressor)	A	174	118	118	174	118	118	174
Water circuit pressure drop	kPa	75	40	51	61	54	32	27.5
Unit water content		4	6	6	7	12	12	14
Max. unit power supply consumption	kW	17.2	23.6	24.8	33.6	50	53	67.3
Max. unit current amperage	A	174	44.4	46.3	67.2	91	103	118
Weight (1)	kg	340	524	555	715	1 124	1 190	1 415

(1) Weight for unit empty. (2) Available static pressure, Eurovent certified. (3) Pressure with clean filter.

Physical data, heat pump units

Characteristics		YLHA 40 T and TP	YLHA 50 T and TP	YLHA 60 T and TP	YLHA 80 T and TP	YLHA 100 T and TP	YLHA 120 T and TP	YLHA 150 T and TP
Cooling capacity	kW	37.8	52	60.5	72.2	96	114	145
Heating capacity	kW	38.6	52.5	59.6	74.7	104	119.6	150
Capacity control	%	100	50 - 100			25 - 50 - 75 - 100		
Power supply	V/ph	400.3.50						
Compressor consumption in cooling	kW	12.4	2 x 8	2 x 9.2	2 x 12.1	4 x 8.3	4 x 10.2	4 x 11.8
Compressor consumption in heating	kW	11.7	2 x 8.3	2 x 9.2	2 x 12.2	4 x 8.7	4 x 9.2	4 x 12.5
Compressor amperage in cooling	A	23.5	2 x 15	2 x 16.7	2 x 24.9	4 x 16	4 x 18.2	4 x 23.5
Compressor amperage in heating	A	24.5	2 x 15.3	2 x 16.7	2 x 24.6	4 x 15.5	4 x 16.9	4 x 24.5
EER/OOP		2.8/3.0	3.0/2.9	3.1/3	2.7/2.8	2.7/2.8	2.6/3.0	2.8/2.8
No. of refrigerant circuits		1				2		
No. of compressors		1	1 TANDEM			2 TANDEM		
Compressor type		SCROLL						
Oil charge in litres	l	3.25	2 x 3.25			4 x 3.25		
Oil type		POLYOL ESTER OIL						
Evaporating unit type		PLATES						
Nominal water flow	l/h	6 500	8 940	10 400	12 420	16 500	19 610	24 940
No. of fans		2			3	4		
Fan diameter	mm	560	630					710
Fan consumption	W	2 x 400	2 x 600		3 x 600	4 x 600		4 x 860
Fan amperage	A	2 x 1.9	2 x 2.8		3 x 2.8	4 x 2.8		4 x 3.9
Total air flow	m^3/h	12 300	18 600		27 500	36 000		48 000
Refrigerant type		R-410A						
Refrigerant charge	kg	12.5	15.5	18	29	2 x 18	2 x 20	2 x 29
Sound power (STD) / (LN)	dB (A)	81/76	84/78	85/80	88/85	85/81	86/82	87/83
Sound pressure at 5 m (STD) / (LN)	dB (A)	60/54	62/56	63/57	66/61	63/59	64/60	65/61
Sound pressure at 10 m (STD) / (LN)	dB (A)	54/48	56/50	57/51	60/55	57/53	58/54	59/55
Dimensions								
Length	mm	1 500	2 104		2 944	3 416		3 770
Width	mm	822	1 011		1 118	1 101		
Height	mm	1 573	1 600		1 600	2 190		2 263
Water connections. female		1 1/4"	2"			2 1/2"		
Water filter. female		1 1/2"	2"			2 1/2"		

Units with hydro kit (version P)

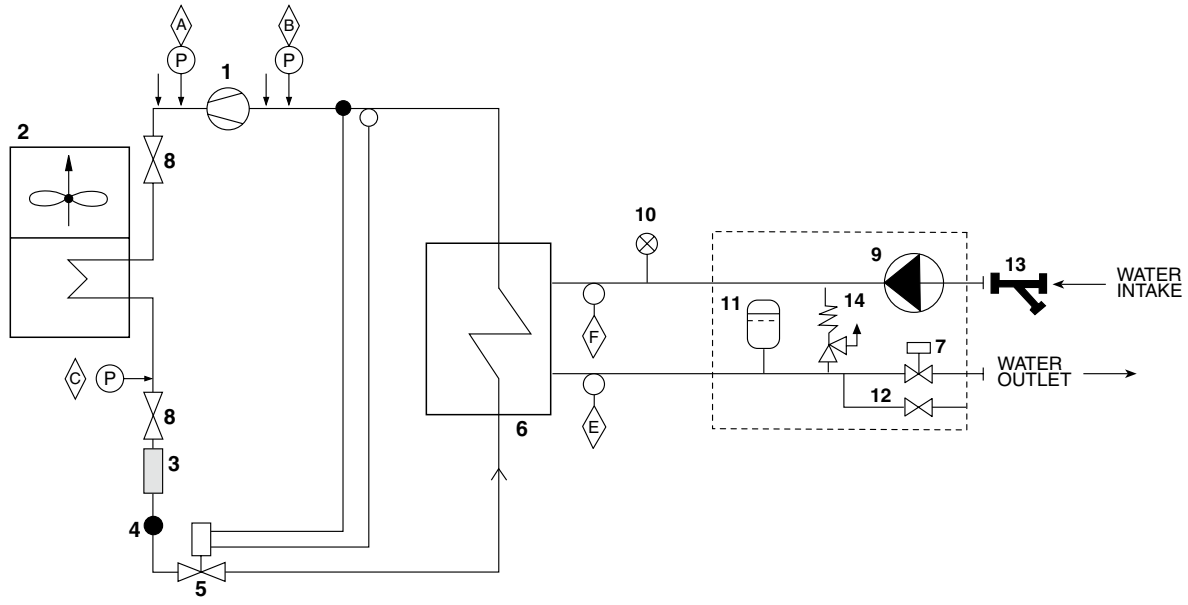
No. of pumps		1						
Available static pressure at rated flow (without filter) (2)	kPa	147	118	160	137	195	231	205
Available static pressure at rated flow (with filter) (3)	kPa	137	117	158	134	192	228	200
Pump consumption	W	1 035	990	1 515	1 580	2 380	3 180	3 400
Pump amperage	A	1.9	1.80	2.9	3.2	4.4	5.5	6.1
Unit water content	l	131	188	194	285	193	195	214
Expansion vessel volume	l	12		18		25		35
Tank capacity	l	115	170		260	152		
Relief valve setting	Bar	6						
Max. unit power supply consumption	kW	17.38	23.9	26.3	34.2	52.4	56.2	74.5
Max. unit current amperage	A	36.2	45.1	49.2	69.8	95.4	108	120
Start-up amperage (compressor)	A	174	118	118	174	118	118	174
Weight (1)	kg	397	593	624	805	1 250	1 316	1 703

Units without pack

Start-up amperage (compressor)	A	174	118	118	174	118	118	174
Pressure drop, cooling mode	kPa	70	37	51	56	53	29.5	25.5
Unit water content		4	6	6	7	12	12	14
Max. unit power supply consumption	kW	16.3	23	24.8	32.6	50	53	71.1
Max. amperage	A	34.3	43.3	46.3	66.6	91	103	114
Weight (1)	kg	337	537	568	735	1 154	1 220	1 615

(1) Weight for unit empty. (2) Available static pressure, Eurovent certified. (3) Pressure with clean filter.

Operation, cooling and hydraulic diagram, YLCA 40 (cool only)



SAFETY/CONTROL DEVICES

A High pressure switch

B Low pressure switch

C Condensing pressure transducer

E Water outlet temperature sensor (antifreeze and display)

F Water intake temperature sensor (setting and display)

COMPONENTS

1 Compressor

2 Air cooled condenser

3 Filter dryer

4 Sight glass

5 Expansion valve

6 Plate heat exchanger

7 Flow switch

8 Globe valve

9 Water pump

10 Automatic air bleed

11 Expansion vessel

12 Drain connection

13 Water filter (not inside the unit)

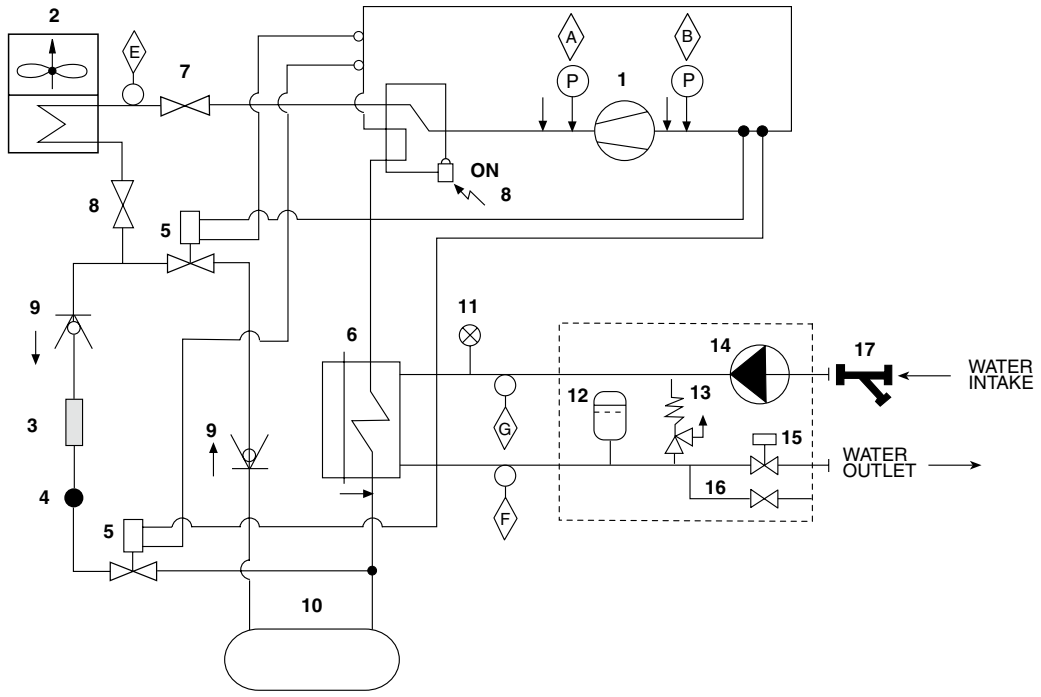
14 Relief valve

→ Pipe connection with Schrader valve

- - - For units with hydro kit only

Heat exchange takes place between the heat transfer liquid (water or glycol water) and the refrigerant in the plate heat exchanger.
Water is cooled, and refrigerant is evaporated and reheated. Then the Scroll compressor condenses the refrigerant (gas) until the condensing pressure is reached, and the refrigerant goes to the air cooled condensing unit. In the air cooled condensing unit, heat is exchanged between the air and the refrigerant. The air is heated and evacuated from the chiller (heat rejection). The refrigerant is condensed and sub-cooled. Then the refrigerant (liquid) goes on to the expansion element, where it is expanded until the evaporating pressure is reached, at which time it goes to the plate heat exchanger to start a new cooling cycle.

Operation, cooling and hydraulic diagram, YLHA 40 (heat pump)



SAFETY/CONTROL DEVICES

A High pressure switch

B Low pressure switch

E Pressure transducer port.
Fan speed setting, defrost management, condensing pressure display (cooling cycle)
or evaporating pressure display (heating cycle)

F Water outlet temperature sensor (Antifreeze, setting and display)

G Water intake temperature sensor (Setting and display)

COMPONENTS

1 Compressor

2 Air cooled condenser

3 Filter dryer

4 Sight glass

5 Expansion valve

6 Plate heat exchanger

7 Globe valve

8 4-way valve

9 Retainer valve

10 Liquid receiver

11 Automatic air bleed

12 Expansion vessel

13 Relief valve

14 Water pump

15 Flow switch

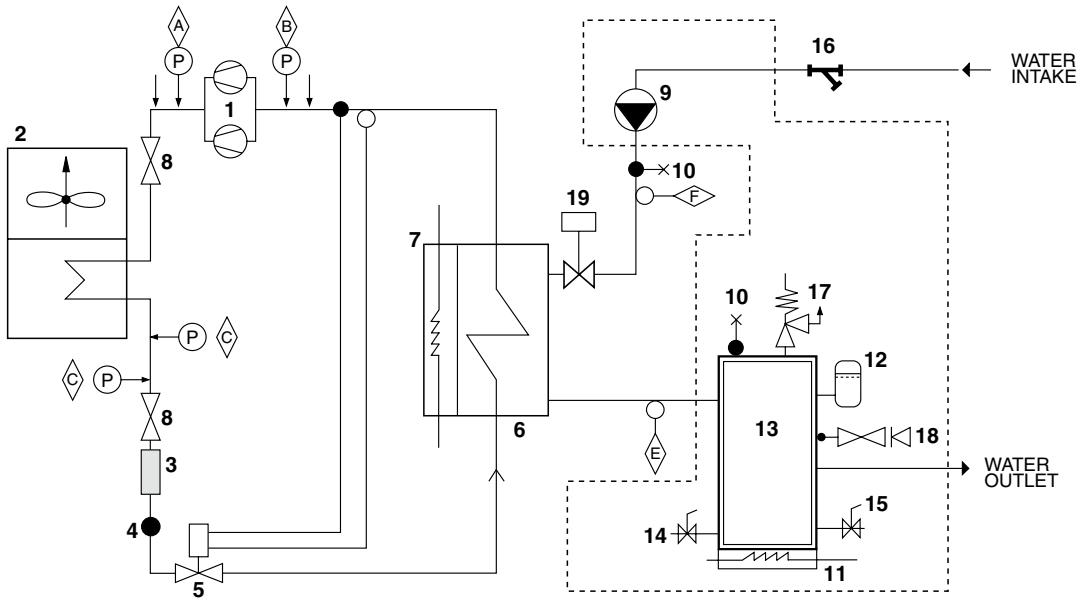
16 Drain connection

17 Water filter (not inside the unit)

→ Pipe connection with Schrader valve

– – – For units with hydro kit only

Operation, cooling and hydraulic diagram, YLHA 50 - 80 (cool only)



SAFETY/CONTROL DEVICES

A High pressure switch

B Low pressure switch

C Condensing pressure transducers

E Water outlet temperature sensor (Antifreeze and display)

F Water intake temperature sensor (Setting and display)

COMPONENTS

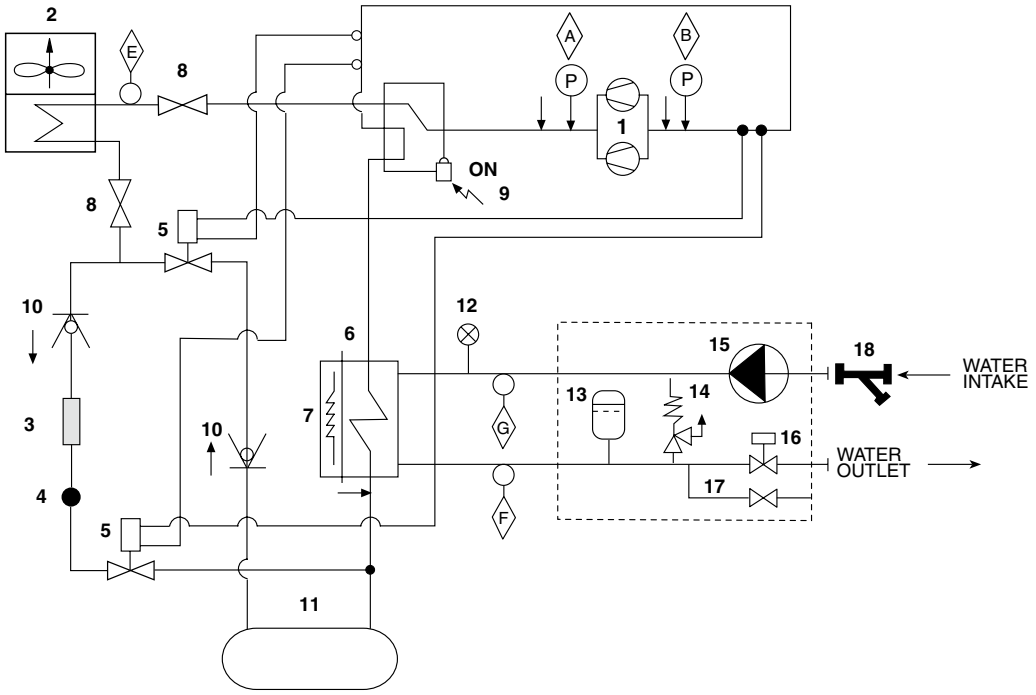
1 Tandem compressor
2 Air cooled condenser
3 Filter dryer
4 Sight glass
5 Expansion valve
6 Plate heat exchanger
7 Heat exchanger antifreeze heater
8 Globe valve
9 Water pump
10 Automatic air bleed
11 Water tank antifreeze heater
12 Expansion vessel
13 Water tank
14 Charge valve
15 Drain valve
16 Water filter (not inside the unit)
17 Relief valve
18 Pressure gauge
19 Flow switch

→ Pipe connection with Schrader valve

– – – For units with hydro kit only

Heat exchange takes place between the heat transfer liquid (water or glycol water) and the refrigerant in the plate heat exchanger.
Water is cooled, and refrigerant is evaporated and reheated. Then the Scroll compressor condenses the refrigerant (gas) until the condensing pressure is reached, and the refrigerant goes to the air cooled condensing unit. In the air cooled condensing unit, heat is exchanged between the air and the refrigerant. The air is heated and evacuated from the chiller (heat rejection). The refrigerant is condensed and subcooled. Then the refrigerant (liquid) goes on to the expansion valve, where it is expanded until the evaporating pressure is reached, at which time it goes to the evaporating unit to start a new cooling cycle.

Operation, cooling and hydraulic diagram, YLHA 50 - 80 (heat pump)



SAFETY/CONTROL DEVICES

A High pressure switch

B Low pressure switch

E Pressure transducer port.
Fan speed setting, defrost management, condensing pressure display (cooling cycle)
or evaporating pressure display (heating cycle)

F Water outlet temperature sensor
(Antifreeze, setting and display)

G Water intake temperature sensor
(Setting and display)

COMPONENTS

1 Tandem compressor
2 Air cooled condenser
3 Filter dryer
4 Sight glass
5 Expansion valve
6 Heat exchanger
7 Heat exchanger antifreeze heater
8 Globe valve
9 4-way valve
10 Retainer valve
11 Liquid receiver
12 Automatic air bleed
13 Expansion vessel
14 Relief valve
15 Water pump
16 Flow switch
17 Drain connection
18 Water filter (not inside the unit)

→ Pipe connection with Schrader valve

– – – For units with hydro kit only

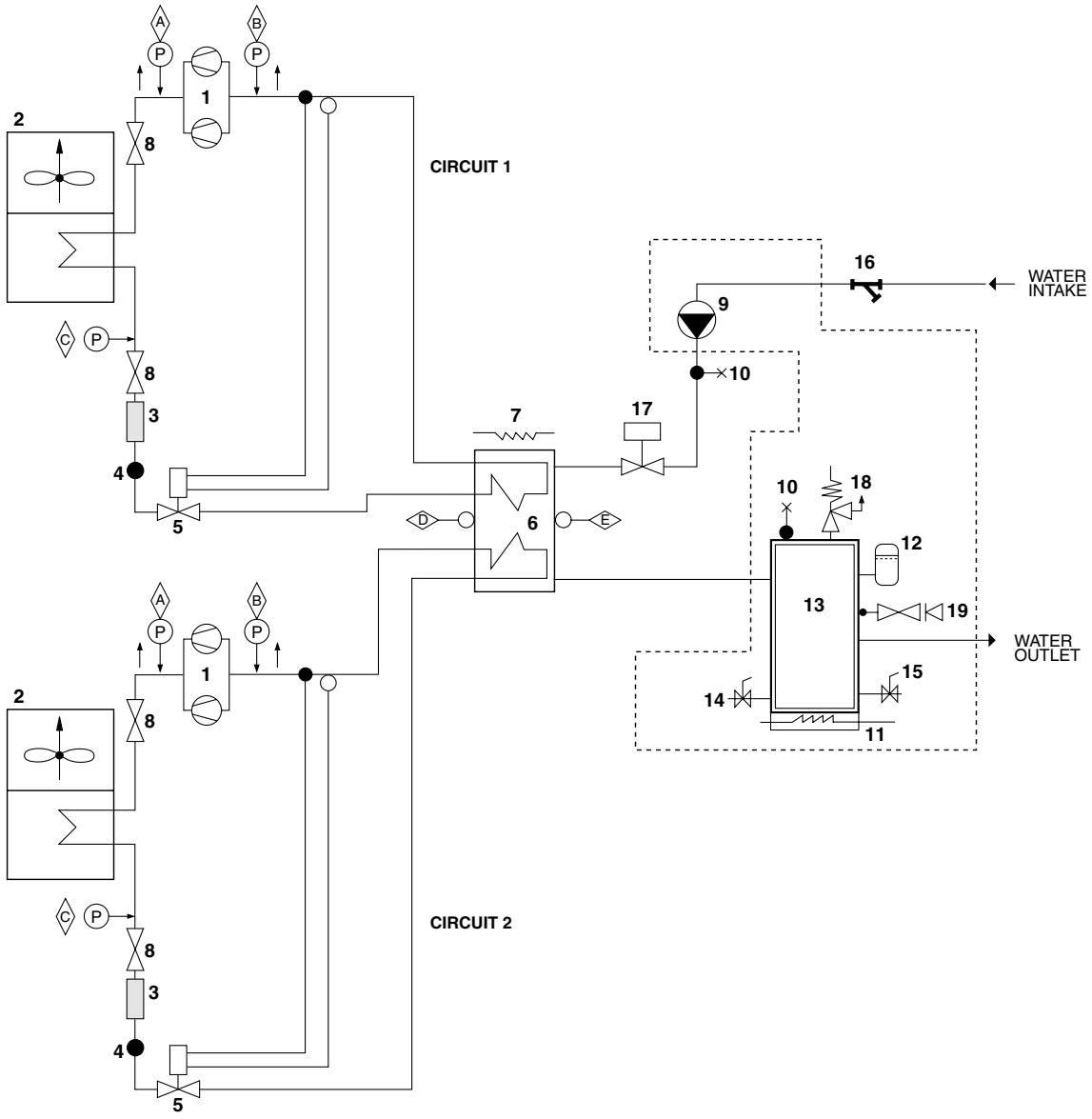
Cooling cycle

The 4-way valve is activated. Heat exchange takes place between the heat transfer liquid (water or glycol water) and the refrigerant in the plate heat exchanger. Water is cooled, and refrigerant is evaporated and reheated. Then the Scroll type compressor condenses the refrigerant (gas) until the condensing pressure is reached, and the refrigerant goes to the air cooled condensing unit. In the air cooled condensing unit, heat is exchanged between the air and the refrigerant. The air is heated and evacuated from the chiller (heat rejection). The refrigerant is condensed and sub-cooled. Then the refrigerant (liquid) goes on to the expansion element, where it is expanded until the evaporating pressure is reached, at which time it goes to the plate heat exchanger to start a new cooling cycle.

Heating cycle

The cycle is reversed to heating mode. The 4-way valve is not activated. The condensing unit becomes the evaporating unit, and the evaporating unit becomes the condensing unit. The water in the plate heat exchanger is heated.

Operation, cooling and hydraulic diagram, YLHA 100, 120 and 150 (cool only)



SAFETY/CONTROL DEVICES

A High pressure switch

B Low pressure switch

E Pressure transducer port. (Fan speed setting, condensing pressure display)

D Water outlet temperature sensor (Antifreeze, setting and display)

E Water intake temperature sensor (Setting and display)

COMPONENTS

1 Compressor (tandem)

2 Air cooled condenser

3 Filter dryer

4 Sight glass

5 Expansion valve

6 Plate heat exchanger

7 Heat exchanger antifreeze heater

8 Globe valve

9 Water pump

10 Manual air purge

11 Water tank antifreeze heater

12 Expansion vessel

13 Water tank

14 Charge valve

15 Drain valve

16 Water filter (not inside the unit)

17 Flow switch

18 Relief valve

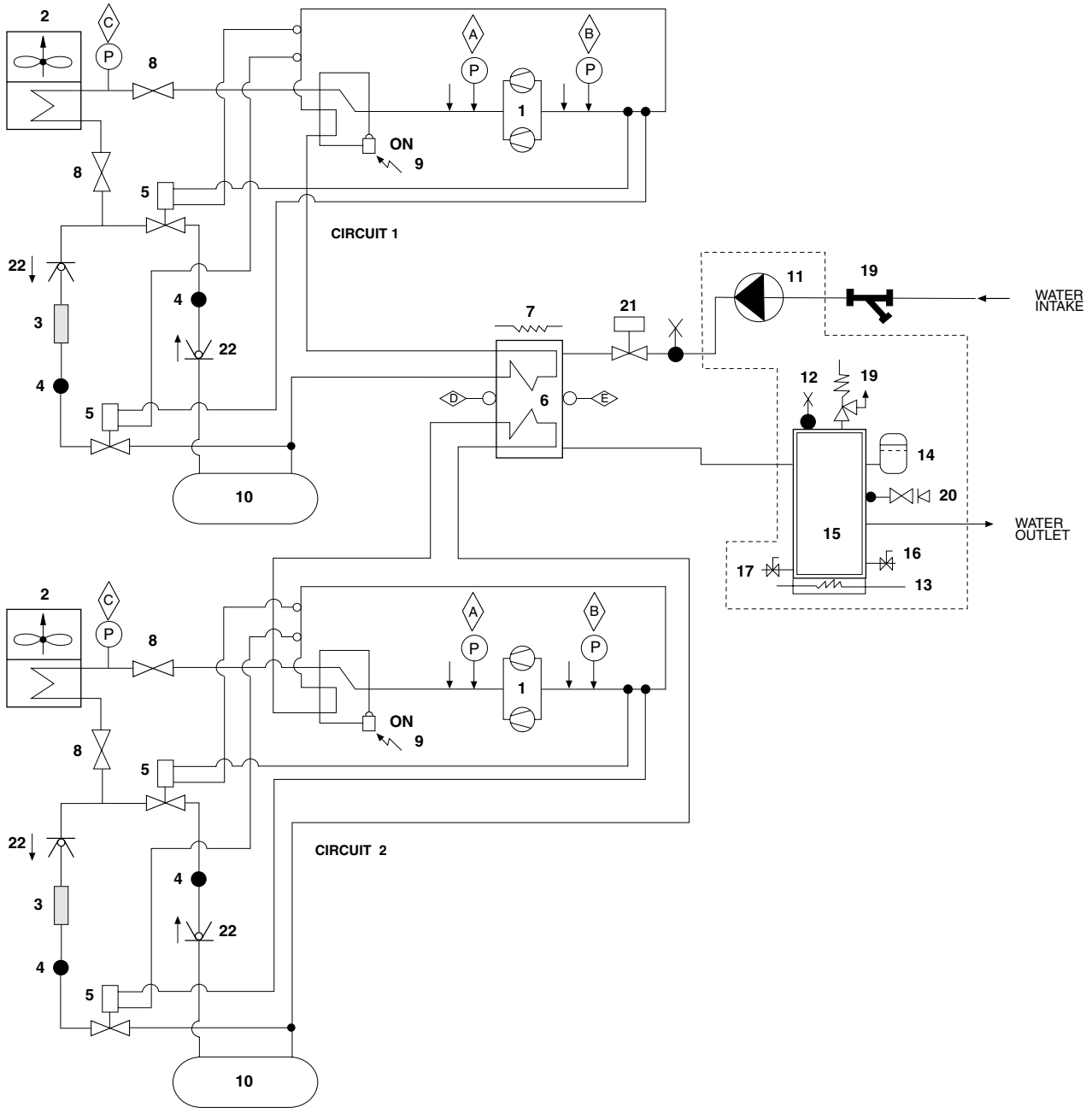
19 Pressure gauge

→ Pipe connection with Schrader valve

- - - For units with hydro kit only

Heat exchange takes place between the heat transfer liquid (water or glycol water) and the refrigerant in the plate heat exchanger.
Water is cooled, and refrigerant is evaporated and reheated. Then the Scroll compressor condenses the refrigerant (gas) until the condensing pressure is reached, and the refrigerant goes to the air cooled condensing unit. In the air cooled condensing unit, heat is exchanged between the air and the refrigerant. The air is heated and evacuated from the chiller (heat rejection). The refrigerant is condensed and sub-cooled. Then the refrigerant (liquid) goes on to the expansion valve, where it is expanded until the evaporating pressure is reached, at which time it goes to the evaporating unit to start a new cooling cycle.

Operation, cooling and hydraulic diagram, YLHA 100, 120 and 150 (heat pump)



SAFETY/CONTROL DEVICES

A High pressure switch

B Low pressure switch

C Pressure transducer port.
Fan speed setting, defrost management, condensing pressure display (cooling cycle)
or evaporating pressure display (heating cycle)

D Water outlet temperature sensor (Antifreeze and display)

E Water intake temperature sensor (Setting and display)

COMPONENTS

1 Tandem compressor
2 Air cooled condenser
3 Filter dryer
4 Sight glass
5 Expansion valve
6 Plate heat exchanger
7 Heat exchanger antifreeze heater
8 Globe valve
9 4-way valve
10 Liquid receiver
11 Water pump
12 Automatic air bleed
13 Water tank antifreeze heater
14 Expansion vessel
15 Water tank
16 Charge valve
17 Drain valve
18 Water filter (not inside the unit)
19 Relief valve
20 Water pressure gauge
21 Flow switch
22 Retainer valve

→ Pipe connection with Schrader valve

– – – For units with hydro kit only

Table 1. Cooling capacities YLCA 40 ÷ 150

YLCA model	Water outlet temp. °C	Outdoor ambient temperature °C DB (80% RH)															
		20		25		30		32		35		40		43		46	
		Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
40	5	42.09	10.30	41.00	10.90	39.14	12.04	38.19	12.45	36.79	13.12	32.51	14.61	30.81	15.49	28.90	16.51
	6	43.05	10.40	42.00	11.00	40.69	12.11	39.66	12.52	38.19	13.19	34.50	14.68	32.66	15.65	30.81	16.64
	7	43.90	10.50	43.00	11.10	41.20	12.18	41.21	12.58	39.66	13.26	36.49	14.75	34.57	15.83	32.73	16.85
	8	46.52	10.60	45.26	11.20	43.42	12.25	42.31	12.65	40.77	13.33	37.67	14.82	35.68	15.90	33.76	16.98
	10	49.02	10.80	47.77	11.40	45.78	12.31	44.67	12.72	42.98	13.40	40.10	14.88	37.96	15.97	35.97	17.05
	12	51.53	11.00	50.28	11.60	48.21	12.31	47.03	12.72	45.26	13.40	42.46	14.95	40.25	16.03	38.11	17.12
	15	55.29	11.40	54.03	11.90	51.82	12.38	50.57	12.79	48.65	13.46	46.15	15.02	43.71	16.03	41.43	17.18
50	5	56.20	14.45	54.98	15.06	52.30	16.08	50.63	16.91	48.96	17.74	44.27	20.16	41.92	21.37	39.58	22.58
	6	57.79	14.54	56.53	15.16	53.78	16.18	52.15	17.01	50.53	17.85	45.76	20.27	43.38	21.49	41.00	22.70
	7	59.39	14.63	58.10	15.25	55.27	16.28	53.69	17.12	52.10	17.96	47.26	20.38	44.84	21.59	42.42	22.80
	8	61.28	14.71	59.95	15.33	57.03	16.37	55.41	17.21	53.80	18.06	48.82	20.48	46.33	21.69	43.84	22.90
	10	65.06	14.88	63.65	15.51	60.55	16.56	58.88	17.41	57.21	18.27	51.95	20.68	49.32	21.89	46.69	23.10
	12	68.84	15.06	67.34	15.70	64.06	16.76	62.34	17.62	60.61	18.49	55.07	20.89	52.30	22.10	49.53	23.30
	15	74.51	15.32	72.89	15.97	69.34	17.05	67.55	17.93	65.76	18.81	59.81	21.20	56.83	22.40	53.86	23.60
60	5	67.10	15.50	64.05	16.40	60.56	17.73	58.42	18.66	56.28	19.60	52.00	21.47	49.51	22.51	47.02	23.55
	6	69.45	15.58	66.30	16.48	62.68	17.81	60.41	18.76	58.15	19.70	53.61	21.58	51.05	22.63	48.48	23.67
	7	71.80	15.65	68.54	16.56	64.80	17.90	62.65	18.75	60.50	19.60	55.22	21.70	52.57	22.75	49.93	23.80
	8	73.81	15.74	70.46	16.66	66.61	18.00	64.17	18.95	61.72	19.91	56.83	21.81	54.11	22.86	51.39	23.92
	10	77.83	15.93	74.30	16.86	70.24	18.22	67.69	19.17	65.14	20.13	60.05	22.04	57.17	23.10	54.30	24.17
	12	81.85	16.11	78.13	17.05	73.87	18.43	71.22	19.39	68.57	20.35	63.28	22.27	60.25	23.34	57.22	24.42
	15	87.90	16.40	83.91	17.35	79.33	18.76	76.53	19.72	73.73	20.68	68.12	22.61	64.86	23.71	61.60	24.80
80	5	85.36	21.04	82.16	22.26	77.67	24.06	74.93	25.33	72.18	26.60	66.69	29.14	63.50	30.55	61.30	31.65
	6	88.46	21.14	85.04	22.37	80.40	24.18	77.49	25.45	74.58	26.73	68.76	29.29	65.47	30.71	62.86	31.92
	7	91.23	21.40	86.95	22.67	81.98	24.40	80.36	25.45	77.60	26.60	70.82	29.45	67.43	30.88	64.04	32.30
	8	94.67	21.36	90.37	22.60	85.44	24.55	82.30	25.72	79.17	27.02	72.89	29.60	69.40	31.03	65.92	32.46
	10	99.83	21.62	95.30	22.88	90.10	24.73	86.83	26.02	83.56	27.32	77.02	29.91	73.33	31.35	69.65	32.80
	12	104.98	21.86	100.22	23.13	94.75	25.01	91.35	26.31	87.96	27.61	81.16	30.22	77.28	31.68	73.39	33.14
	15	112.74	22.61	107.63	23.55	101.75	25.46	98.16	26.76	94.56	28.07	87.37	30.69	83.19	32.17	79.54	33.66
100	5	109.0	27.0	106.2	28.6	98.6	31.1	95.6	32.1	91.2	32.8	83.7	36.2	79.1	37.7	76.0	40.0
	6	111.5	27.5	108.8	29.1	101.5	31.4	98.5	32.5	94.0	33.1	86.7	36.9	82.2	38.2	79.3	40.3
	7	113.8	28.0	111.5	29.6	104.3	31.8	101.3	32.9	98.0	33.8	89.8	37.4	85.3	38.7	82.5	40.6
	8	117.3	28.5	114.1	30.1	107.1	32.1	104.2	33.5	100.0	34.5	92.8	38.0	88.6	39.2	85.7	41.0
	10	122.7	29.3	119.6	30.9	112.7	32.8	109.9	34.5	105.8	35.1	99.0	38.7	94.9	39.8	92.2	41.6
	12	128.3	29.9	125.2	31.5	118.0	34.0	115.2	35.1	111.1	36.7	104.3	39.3	100.1	40.8	96.0	42.6
	15	136.2	32.4	133.1	33.8	126.0	36.1	123.2	36.9	119.1	38.3	112.1	40.6	107.8	41.9	101.9	43.3
120	5	132.3	32.0	128.9	33.9	119.7	36.8	116.1	38.0	110.7	38.8	101.6	42.9	96.0	44.6	92.3	47.3
	6	135.4	32.5	132.1	34.4	123.2	37.2	119.6	38.4	114.2	39.2	105.3	43.6	99.8	45.2	96.3	47.7
	7	138.2	33.1	135.4	35.0	126.6	37.6	123.0	39.0	119.0	40.0	109.0	44.3	103.6	45.8	100.2	48.1
	8	142.4	33.7	138.6	35.6	130.1	38.0	126.5	39.6	121.4	40.8	112.7	45.0	107.6	46.4	104.1	48.5
	10	149.0	34.6	145.2	36.6	136.9	38.8	133.5	40.8	128.5	41.6	120.2	45.8	115.2	47.1	111.9	49.2
	12	155.8	35.4	151.1	37.6	143.3	40.3	139.9	41.6	134.9	43.4	126.6	46.5	121.5	48.3	116.6	50.4
	15	165.3	38.3	161.6	40.0	153.0	42.7	149.6	43.7	144.6	45.3	136.1	48.0	130.9	49.6	123.8	51.2
150	5	162.7	46.0	81.4	23.0	151.9	49.4	147.3	51.0	140.5	52.0	128.9	57.5	58.8	31.6	117.6	63.2
	6	168.6	46.3	84.3	23.2	156.3	49.9	151.8	51.5	144.9	52.5	133.6	58.5	61.0	31.8	121.9	63.6
	7	174.5	46.7	87.3	23.3	160.6	50.4	156.1	52.2	151.0	53.6	138.3	59.3	63.1	32.0	126.3	64.0
	8	180.4	47.0	90.2	23.5	165.1	50.9	160.5	53.1	154.0	54.7	143.0	60.3	65.3	32.2	130.6	64.4
	10	192.2	47.7	96.1	23.8	173.7	52.0	169.4	54.7	163.1	55.7	152.5	61.3	69.7	32.6	139.3	65.3
	12	204.1	48.4	102.1	24.2	181.8	54.0	177.5	55.7	171.2	58.2	160.6	62.3	74.0	33.0	148.0	66.1
	15	221.8	49.4	110.9	24.7	194.1	57.2	189.8	58.6	183.5	60.7	172.7	64.3	80.5	33.7	161.0	67.3

Ab. power = Includes compressor and fan consumption.

Table 2. Cooling capacities YLCA 40 ÷ 150 (35% ethylene glycol)

YLCA model	Water outlet temp. °C	Outdoor ambient temperature °C DB (80% RH)															
		20		25		30		32		35		40		43		46	
		Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
40	-5	27.64	7.38	26.50	8.03	25.35	8.78	24.88	9.11	24.10	10.20	22.21	10.59	21.16	11.18	20.04	11.86
	-4	29.22	7.60	27.99	8.24	26.57	9.03	26.03	9.35	23.83	10.43	23.10	10.87	21.90	11.49	20.60	12.27
	-2	32.07	8.01	30.85	8.65	29.17	9.49	28.50	9.83	27.36	10.92	25.15	11.40	23.75	12.06	22.17	12.82
	0	34.94	8.43	33.84	9.10	32.10	9.95	31.07	10.32	29.76	11.41	27.26	11.97	25.66	12.65	23.69	13.38
	2	39.00	8.83	37.00	9.57	34.95	10.45	33.84	10.83	32.35	11.92	29.51	12.55	27.71	13.25	25.96	13.93
	4	42.05	9.29	40.19	10.06	37.81	10.96	36.59	11.36	34.92	12.44	31.72	13.16	29.71	13.87	27.76	14.75
50	-5	34.91	10.78	33.34	11.68	31.75	12.71	31.01	13.13	29.87	13.81	27.40	15.09	25.93	15.86	24.49	16.70
	-4	36.73	11.05	35.12	11.95	33.27	13.01	32.50	13.43	31.31	14.13	28.71	15.45	27.17	16.24	25.53	17.24
	-2	40.12	11.58	38.60	12.50	36.50	13.61	35.66	14.07	34.36	14.79	31.52	16.15	29.80	16.99	27.87	17.96
	0	43.50	12.12	42.21	13.07	40.12	14.22	38.99	14.70	37.55	15.45	34.46	16.90	32.57	17.78	30.22	18.68
	2	48.19	12.66	45.98	13.66	43.69	14.85	42.58	15.35	41.02	16.15	37.64	17.66	35.59	18.56	33.60	19.40
	4	51.58	13.20	49.76	14.25	47.26	15.48	46.17	16.00	44.49	16.84	40.81	18.41	38.60	19.35	36.47	20.47
60	-5	40.54	11.76	38.72	12.75	36.87	13.87	36.01	14.33	34.69	15.07	31.82	16.47	30.11	17.31	28.44	18.23
	-4	42.65	12.05	40.78	13.04	38.64	14.20	37.74	14.66	36.36	15.42	33.34	16.87	31.55	17.72	29.65	18.82
	-2	46.59	12.64	44.83	13.64	42.38	14.86	41.41	15.35	39.90	16.14	36.60	17.62	34.61	18.55	32.37	19.60
	0	50.52	13.23	49.02	14.26	46.59	15.52	45.27	16.04	43.60	16.87	40.02	18.45	37.82	19.40	35.09	20.38
	2	55.96	18.32	53.40	14.91	50.73	16.21	49.45	16.75	47.63	17.62	43.71	19.27	41.32	20.26	39.02	21.17
	4	59.90	14.41	57.78	15.55	54.88	16.90	53.62	17.46	51.67	18.38	47.39	20.09	44.83	21.12	42.35	22.34
80	-5	51.99	15.96	49.66	17.30	47.29	18.82	46.19	19.45	44.49	20.45	40.81	22.35	38.62	23.49	36.47	24.74
	-4	54.71	16.36	52.30	17.70	49.56	19.27	48.41	19.89	46.63	20.92	42.77	22.89	40.47	24.05	38.02	25.54
	-2	59.75	17.16	57.50	18.51	54.36	20.16	53.11	20.83	51.18	21.91	46.95	23.92	44.39	25.17	41.52	26.60
	0	64.80	17.96	62.87	19.36	59.75	21.06	58.07	21.77	55.93	22.89	51.33	25.04	48.51	26.33	45.01	27.66
	2	71.78	18.75	68.49	20.23	65.07	22.00	63.42	22.73	61.10	23.92	56.06	26.15	53.00	27.49	50.05	28.73
	4	76.82	19.55	74.11	21.10	70.39	22.93	68.77	23.69	66.27	24.95	60.78	27.27	57.50	28.66	54.32	30.32
100	-5	65.7	20.3	62.7	22.0	59.7	23.9	58.3	24.7	56.2	26.0	51.5	28.4	48.8	29.9	46.1	31.4
	-4	69.1	20.8	66.1	22.5	62.6	24.5	61.1	25.3	58.9	26.6	54.0	29.1	51.1	30.6	48.0	32.4
	-2	75.5	21.8	72.6	23.5	68.7	25.6	67.1	26.5	64.6	27.8	59.3	30.4	56.1	32.0	52.4	33.8
	0	81.8	22.8	79.4	24.6	75.5	26.8	73.3	27.7	70.6	29.1	64.8	31.8	61.3	33.5	56.8	35.2
	2	90.7	23.8	86.5	25.7	82.2	27.9	80.1	28.9	77.2	30.4	70.8	33.2	66.9	34.9	63.2	36.5
	4	97.0	24.8	93.6	26.8	88.9	29.1	86.9	30.1	83.7	31.7	76.8	34.7	72.6	36.4	68.6	38.5
120	-5	79.7	24.0	76.2	26.0	72.5	28.3	70.8	29.2	68.2	30.8	62.6	33.6	59.2	35.3	55.9	37.2
	-4	83.9	24.6	80.2	26.6	76.0	29.0	74.2	29.9	71.5	31.5	65.6	34.4	62.1	36.2	58.3	38.4
	-2	91.6	25.8	88.2	27.8	83.4	30.3	81.4	31.3	78.5	32.9	72.0	36.0	68.1	37.8	63.7	40.0
	0	99.4	27.0	96.4	29.1	91.6	31.7	89.0	32.7	85.8	34.4	78.7	37.6	74.4	39.6	69.0	41.6
	2	110.1	28.2	105.0	30.4	99.8	33.1	97.3	34.2	93.7	36.0	86.0	39.3	81.3	41.3	76.8	43.2
	4	117.8	29.4	113.6	31.7	107.9	34.5	105.5	35.6	101.6	37.5	93.2	41.0	88.2	43.1	83.3	45.6
150	-5	101.2	32.2	96.6	34.9	92.0	37.9	89.9	39.2	86.6	41.2	79.4	45.0	75.1	47.3	71.0	49.8
	-4	106.5	33.0	101.8	35.7	96.4	38.8	94.2	40.1	90.7	42.2	83.2	46.1	78.8	48.5	74.0	51.5
	-2	116.3	34.6	111.9	37.3	105.8	40.6	103.3	42.0	99.6	44.1	91.4	48.2	86.4	50.7	80.8	53.6
	0	126.1	36.2	122.3	39.0	116.3	42.4	113.0	43.9	108.8	46.1	99.9	50.4	94.4	53.1	87.6	55.7
	2	139.7	37.8	133.3	40.8	126.6	44.3	123.4	45.8	118.9	48.2	109.1	52.7	103.1	55.4	97.4	57.9
	4	149.5	39.4	144.2	42.5	137.0	46.2	133.8	47.7	128.9	50.3	118.3	55.0	111.9	57.7	105.7	61.1

Ab. power = Includes compressor and fan consumption.

Table 3. Cooling capacities YLCA 40 ÷ 150

YLHA Model	Water outlet temp. °C	Outdoor ambient temperature °C DB (80% RH)															
		20		25		30		32		35		40		43		46	
		Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
40	5	41.15	10.50	40.30	10.90	38.33	11.80	36.80	12.45	35.08	13.10	31.00	14.50	30.10	14.90	29.10	15.30
	6	42.73	10.60	41.80	11.00	39.84	11.90	38.20	12.55	36.41	13.20	32.90	14.60	31.15	15.00	29.38	15.40
	7	44.90	10.70	43.44	11.10	41.37	12.00	39.70	12.65	37.82	13.30	34.80	14.70	33.00	15.10	31.21	15.50
	8	45.47	10.80	44.58	11.20	42.52	12.10	40.80	12.75	38.87	13.40	35.92	14.80	34.10	15.20	32.20	15.60
	10	47.92	11.00	47.05	11.40	44.82	12.30	43.00	12.95	40.98	13.60	38.24	15.00	36.27	15.40	34.31	15.80
	12	50.36	11.20	49.52	11.60	47.21	12.50	45.30	13.15	43.16	13.80	40.49	15.20	38.41	15.60	36.34	16.00
	15	57.22	11.50	53.23	11.90	50.75	12.80	48.70	13.45	46.40	14.10	44.01	15.50	41.76	15.90	39.51	16.40
50	5	56.1	13.9	54.9	14.5	52.2	15.5	50.5	16.3	48.9	17.1	44.2	19.4	41.8	20.6	39.5	21.8
	6	57.7	14.0	56.4	14.6	53.7	15.6	52.1	16.4	50.4	17.2	45.7	19.5	43.3	20.7	40.9	21.9
	7	59.3	14.1	58.0	14.7	55.2	15.7	53.6	16.5	52.0	17.3	47.2	19.6	44.8	20.8	42.3	22.0
	8	61.2	14.2	59.8	14.8	56.9	15.8	55.3	16.6	53.7	17.4	48.7	19.7	46.2	20.9	43.8	22.1
	10	64.9	14.3	63.5	14.9	60.4	15.9	58.8	16.8	57.1	17.6	51.8	19.9	49.2	21.1	46.6	22.3
	12	68.7	14.5	67.2	15.1	63.9	16.1	62.2	17.0	60.5	17.8	55.0	20.1	52.2	21.3	49.4	22.4
	15	74.4	14.8	72.8	15.4	69.2	16.4	67.4	17.3	65.6	18.1	59.7	20.4	56.7	21.6	53.8	22.7
60	5	67.10	15.50	64.05	16.40	60.56	17.73	58.42	18.66	56.28	19.60	52.00	21.47	49.51	22.51	47.02	23.55
	6	69.45	15.58	66.30	16.48	62.68	17.81	60.41	18.76	58.15	19.70	53.61	21.58	51.05	22.63	48.48	23.67
	7	71.80	15.65	68.54	16.56	64.80	17.90	62.65	18.95	60.50	19.60	55.22	21.70	52.57	22.75	49.93	23.80
	8	73.81	15.74	70.46	16.66	66.61	18.00	64.17	48.95	61.72	19.91	56.83	21.81	54.11	22.86	51.39	23.92
	10	77.83	15.93	74.30	16.86	70.24	18.22	67.69	19.17	65.14	20.13	60.05	22.04	51.17	23.10	54.30	24.17
	12	81.85	16.11	78.13	17.05	73.87	18.43	71.22	19.39	68.57	20.35	63.28	22.27	60.25	23.34	57.22	24.42
	15	87.90	16.40	83.91	17.35	79.33	18.76	76.53	19.72	73.73	20.68	68.12	22.61	64.86	23.71	61.60	24.80
80	5	78.0	20.7	76.4	21.8	72.3	23.5	69.7	24.8	67.2	26.0	62.1	28.5	59.1	29.9	57.0	30.9
	6	80.9	20.8	79.1	21.9	74.8	23.6	72.1	24.9	69.4	26.1	64.0	28.6	60.9	30.0	58.5	31.2
	7	83.8	20.9	81.8	22.0	77.3	23.7	74.8	24.9	72.2	26.0	65.9	28.8	62.7	30.2	59.6	31.6
	8	86.6	21.1	84.1	22.1	79.5	23.9	76.6	25.1	73.7	26.4	67.8	28.9	64.6	30.3	61.3	31.7
	10	91.7	21.3	88.7	22.4	83.8	24.2	80.8	25.4	77.7	26.7	71.7	29.2	68.2	30.6	64.8	32.1
	12	96.0	21.6	93.2	22.6	88.2	24.4	85.0	25.7	81.8	27.0	75.5	29.5	71.9	31.0	68.3	32.4
	15	103.2	22.4	100.1	23.0	94.7	24.9	91.3	26.2	88.0	27.4	81.3	30.0	77.4	31.4	74.0	32.9
100	5	106.8	28.4	104.0	30.1	96.6	32.7	93.7	33.8	89.3	34.4	82.0	38.1	77.4	39.5	74.5	42.0
	6	109.2	28.9	106.6	30.5	99.4	33.0	96.5	34.1	92.1	34.8	84.9	38.7	80.5	40.1	77.7	42.4
	7	111.5	29.4	109.2	31.0	102.1	33.4	99.2	34.6	96.0	35.5	87.9	39.3	83.6	40.6	80.8	42.7
	8	114.9	29.9	111.8	31.6	105.0	33.7	102.1	35.2	97.9	36.2	90.9	40.0	86.8	41.2	84.0	43.0
	10	102.2	30.7	117.1	32.4	110.4	34.4	107.7	36.2	103.7	36.9	97.0	40.6	92.9	41.8	90.3	43.7
	12	125.7	31.4	122.6	33.1	115.6	35.7	112.9	36.9	108.8	38.6	102.1	41.3	98.0	42.8	94.1	44.7
	15	133.4	34.0	130.4	35.5	123.4	37.9	120.7	38.8	116.7	40.2	109.8	42.6	105.6	44.0	99.8	45.4
120	5	126.8	34.6	123.5	36.6	114.7	39.8	111.2	41.1	106.0	41.9	97.3	46.3	92.0	48.1	88.4	51.1
	6	129.7	35.1	126.5	37.2	118.0	40.2	114.6	41.5	109.4	42.3	100.9	47.1	95.6	48.8	92.3	51.5
	7	132.4	35.7	129.7	37.8	121.3	40.6	117.8	42.1	114.0	43.2	104.4	47.8	99.2	49.4	96.0	51.9
	8	136.5	36.4	132.8	38.5	124.6	41.0	121.2	42.8	116.3	44.1	108.0	48.6	103.1	50.1	99.7	52.3
	10	142.7	37.4	139.1	39.5	131.1	41.9	127.9	44.1	123.1	44.9	115.1	49.4	110.4	50.8	107.2	53.1
	12	149.2	38.2	145.6	40.3	137.3	43.5	134.0	44.9	129.2	46.9	121.3	50.2	116.4	52.1	111.7	54.4
	15	158.4	41.4	154.8	43.2	146.6	46.1	143.3	47.2	138.5	48.9	130.4	51.8	125.4	53.6	118.6	55.3
150	5	161.2	40.5	157.1	42.8	145.9	46.6	141.5	48.1	134.9	49.1	123.8	54.2	117.0	56.4	112.5	59.9
	6	165.0	41.2	161.0	43.5	150.1	47.1	145.7	48.6	139.2	49.5	128.3	55.2	121.6	57.2	117.3	60.4
	7	168.4	41.9	165.0	44.2	154.3	47.5	149.9	49.3	145.0	50.6	132.8	56.0	126.2	57.9	122.1	60.8
	8	173.6	42.7	168.9	45.1	158.5	48.0	154.1	50.1	147.9	51.7	137.3	57.0	131.1	58.7	126.8	61.3
	10	181.6	43.8	176.9	46.2	166.8	49.1	162.7	51.7	156.6	52.6	146.5	57.9	140.4	59.5	136.3	62.2
	12	189.8	44.7	185.2	47.2	174.6	51.0	170.5	52.6	164.4	55.0	154.3	58.8	148.0	61.1	142.1	63.8
	15	201.5	48.5	196.9	50.6	186.4	54.0	182.3	55.3	176.2	57.3	165.8	60.7	159.5	62.7	150.8	64.8

Ab. power = Includes compressor and fan consumption.

Table 4. Cooling capacities YLCA 40 ÷ 150 (35% ethylene glycol)

YLCA Model	Water outlet temp. °C	Outdoor ambient temperature °C DB (80% RH)															
		20		25		30		32		35		40		43		46	
		Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
40	-5	26.35	7.39	25.27	8.04	24.18	8.80	23.73	9.13	22.99	10.21	21.18	10.60	20.18	11.20	19.11	11.88
	-4	27.86	7.61	26.69	8.26	25.34	9.04	24.82	9.37	22.73	10.45	22.03	10.89	20.89	11.50	19.64	12.29
	-2	30.58	8.03	29.42	8.67	27.82	9.50	27.18	9.85	26.09	10.94	23.98	11.42	22.65	12.08	21.14	12.84
	0	33.32	8.44	32.27	9.11	30.61	9.97	29.63	10.34	28.38	11.43	25.99	11.99	24.47	12.67	22.59	13.40
	2	37.19	8.85	35.28	9.58	33.33	10.46	32.27	10.85	30.85	11.94	28.14	12.57	26.43	13.27	24.76	13.96
	4	40.10	9.30	38.32	10.07	36.06	10.98	34.89	11.38	33.30	12.45	30.25	13.18	28.33	13.89	26.47	14.78
50	-5	34.8	10.4	33.3	11.3	31.7	12.2	31.0	12.6	29.8	13.3	27.3	14.5	25.9	15.3	24.4	16.1
	-4	36.7	10.6	35.0	11.5	33.2	12.5	32.4	12.9	31.2	13.6	28.7	14.9	27.1	15.6	25.5	16.6
	-2	40.0	11.2	38.5	12.0	36.4	13.1	35.6	13.5	34.3	14.2	31.5	15.6	29.7	16.4	27.8	17.3
	0	43.4	11.7	42.1	12.6	40.0	13.7	38.9	14.2	37.5	14.9	34.4	16.3	32.5	17.1	30.2	18.0
	2	48.1	12.2	45.9	13.2	43.6	14.3	42.5	14.8	40.9	15.6	37.6	17.0	35.5	17.9	33.5	18.7
	4	51.5	12.7	49.7	13.7	47.2	14.9	46.1	15.4	44.4	16.2	40.7	17.7	38.5	18.6	36.4	19.7
60	-5	40.54	11.76	38.72	12.75	36.87	13.87	36.01	14.33	34.69	15.07	31.82	16.47	30.11	17.31	28.44	18.23
	-4	42.65	12.05	40.78	13.04	38.64	14.20	37.74	14.66	36.36	15.42	33.34	16.87	31.55	17.72	29.65	18.82
	-2	46.59	12.64	44.83	13.64	42.38	14.86	41.41	15.35	39.90	16.14	36.60	17.62	34.61	18.55	32.37	19.60
	0	50.52	13.23	49.02	14.26	46.59	15.52	45.27	16.04	43.60	16.87	40.02	18.45	37.82	19.40	35.09	20.38
	2	55.96	13.82	53.40	14.91	50.73	16.21	49.45	16.75	47.63	17.62	43.71	19.27	41.32	20.26	39.02	21.17
	4	59.90	14.41	57.78	15.55	54.88	16.90	53.62	17.46	51.67	18.38	47.39	20.09	44.83	21.12	42.35	22.34
80	-5	48.4	15.6	46.2	16.9	44.0	18.4	43.0	19.0	41.4	20.0	38.0	21.8	35.9	23.0	33.9	24.2
	-4	50.9	16.0	48.7	17.3	46.1	18.8	45.0	19.4	43.4	20.5	39.8	22.4	37.7	23.5	35.4	25.0
	-2	55.6	16.8	53.5	18.1	50.6	19.7	49.4	20.4	47.6	21.4	43.7	23.4	41.3	24.6	38.6	26.0
	0	60.3	17.6	58.5	18.9	55.6	20.6	54.0	21.3	52.0	22.4	47.8	24.5	45.1	25.7	41.9	27.0
	2	66.8	18.3	63.7	19.8	60.5	21.5	59.0	22.2	56.8	23.4	52.2	25.6	49.3	26.9	46.6	28.1
	4	71.5	19.1	69.0	20.6	65.5	22.4	64.0	23.2	61.7	24.4	56.6	26.7	53.5	28.0	50.5	29.6
100	-5	64.3	21.3	61.4	23.1	58.5	25.1	57.1	26.0	55.0	27.3	50.5	29.8	47.8	31.4	45.1	33.0
	-4	67.7	21.8	64.7	23.6	61.3	25.7	59.9	26.6	57.7	27.9	52.9	30.5	50.1	32.1	47.0	34.1
	-2	73.9	22.9	71.1	24.7	67.3	26.9	65.7	27.8	63.3	29.2	58.1	31.9	54.9	33.6	51.4	35.5
	0	80.2	24.0	77.8	25.8	73.9	28.1	71.8	29.1	69.2	30.5	63.5	33.4	60.0	35.1	55.7	36.9
	2	88.8	25.0	84.7	27.0	80.5	29.4	78.5	30.3	75.6	31.9	69.4	34.9	65.6	36.7	61.9	38.3
	4	95.0	26.1	91.7	28.2	87.1	30.6	85.1	31.6	82.0	33.3	75.2	36.4	71.1	38.2	67.2	40.5
120	-5	76.4	25.9	73.0	28.1	69.5	30.6	67.9	31.6	65.4	33.2	60.0	36.3	56.7	38.2	53.6	40.2
	-4	80.4	26.6	76.8	28.8	72.8	31.3	71.1	32.3	68.5	34.0	62.8	37.2	59.5	39.1	55.9	41.5
	-2	87.8	27.9	84.5	30.1	79.9	32.7	78.0	33.8	75.2	35.6	69.0	38.8	65.2	40.9	61.0	43.2
	0	95.2	29.2	92.4	31.4	87.8	34.2	85.3	35.4	82.2	37.2	75.4	40.7	71.3	42.8	66.1	44.9
	2	105.5	30.5	100.6	32.9	95.6	35.7	93.2	36.9	89.8	38.8	82.4	42.5	77.9	44.7	73.5	46.7
	4	112.9	31.8	108.9	34.3	103.4	37.2	101.0	38.5	97.4	40.5	89.3	44.3	84.5	46.5	79.8	49.2
150	-5	97.2	30.4	92.8	32.9	88.4	35.8	86.3	37.0	83.1	38.9	76.3	42.5	72.2	44.7	68.2	47.1
	-4	102.2	31.1	97.7	33.7	92.6	36.7	90.5	37.8	87.1	39.8	79.9	43.5	75.6	45.8	71.1	48.6
	-2	111.7	32.6	107.4	35.2	101.6	38.4	99.2	39.6	95.6	41.7	87.7	45.5	82.9	47.9	77.6	50.6
	0	121.1	34.2	117.5	36.8	111.7	40.1	108.5	41.4	104.5	43.5	95.9	47.6	90.6	50.1	84.1	52.6
	2	134.1	35.7	128.0	38.5	121.6	41.8	118.5	43.2	114.2	45.5	104.7	49.7	99.0	52.3	93.5	54.6
	4	143.6	37.2	138.5	40.1	131.5	43.6	128.5	45.1	123.8	47.5	113.6	51.9	107.4	54.5	101.5	57.7

Ab. power = Includes compressor and fan consumption.

Table 5. Heating capacities YLCA 40 ÷ 150

YLHA Model	Water outlet temp. °C	Outdoor ambient temperature °C DB (80% RH)																	
		-15		-10		-5		0		5		7		10		15		20	
		Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power	Cap.	Ab. power
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
40	30	16.6	7.6	21.3	8.2	28.5	8.5	36.7	9.0	37.8	9.1	39.6	9.3	42.5	9.4	46.9	9.4	51.2	9.5
	35	16.0	8.6	20.7	8.9	25.4	9.5	34.8	10.0	36.9	10.1	39.3	10.3	41.4	10.4	45.6	10.4	49.9	10.5
	40	13.8	9.5	20.0	9.7	23.2	10.5	32.2	11.2	35.5	11.3	38.9	11.5	40.2	11.6	44.3	11.6	48.4	11.7
	45	-	-	19.3	10.8	20.8	11.4	29.5	12.4	34.1	12.5	38.6	12.6	39.0	12.6	43.0	12.7	47.0	12.8
	50	-	-	18.1	11.4	19.7	12.1	27.0	13.3	32.5	13.4	37.9	13.5	36.7	13.6	39.1	13.7	45.6	13.8
50	30	22.6	10.8	28.9	11.8	38.8	12.2	49.9	12.9	51.5	13.0	53.9	13.3	57.8	13.4	63.7	13.4	69.7	13.5
	35	21.8	12.3	28.1	12.7	34.6	13.5	47.3	14.3	50.1	14.4	53.4	14.7	56.3	14.8	62.0	14.8	67.8	14.9
	40	-	-	27.3	13.8	31.5	14.9	43.8	16.0	48.3	16.2	52.9	16.4	54.7	16.5	60.2	16.5	65.9	16.6
	45	-	-	-	-	28.4	16.3	40.2	17.6	46.4	17.8	52.5	17.9	53.1	18.0	58.5	18.1	63.9	18.2
	50	-	-	-	-	26.8	17.2	36.7	19.0	44.2	19.1	51.6	19.3	49.9	19.4	53.1	19.5	62.0	19.6
60	30	25.6	12.0	32.8	13.0	44.0	13.4	56.6	14.3	58.4	14.4	61.1	14.7	65.6	14.8	72.4	14.9	79.1	14.9
	35	24.7	13.6	31.9	14.0	39.3	14.9	53.7	15.8	56.9	16.0	60.6	16.2	63.9	16.3	70.4	16.4	77.0	16.5
	40	21.3	14.9	30.9	15.2	35.8	16.5	49.7	17.7	54.9	17.9	60.1	18.1	62.1	18.2	68.4	18.3	74.8	18.4
	45	0.0	0.0	29.8	17.0	32.2	18.0	45.6	19.5	52.6	19.7	59.6	19.8	60.2	19.9	66.4	20.0	72.5	20.1
	50	0.0	0.0	28.0	18.0	30.4	19.0	41.7	21.0	50.1	21.2	58.6	21.3	56.7	21.5	60.3	21.6	70.4	21.7
80	30	32.1	16.0	41.2	17.3	55.2	17.9	71.0	19.0	73.2	19.2	76.6	19.6	82.3	19.7	90.7	19.8	99.2	19.9
	35	31.0	18.1	40.0	18.7	49.2	19.9	67.3	21.0	71.3	21.3	76.0	21.6	80.1	21.8	88.2	21.9	96.5	22.0
	40	-	-	38.8	20.3	44.8	22.0	62.3	23.6	68.8	23.8	75.3	24.2	77.8	24.3	85.7	24.4	93.7	24.5
	45	-	-	-	-	40.3	24.0	57.1	26.0	66.0	26.2	74.7	26.4	75.5	26.5	83.2	26.6	90.9	26.8
	50	-	-	-	-	-	-	52.3	28.0	62.8	28.2	73.4	28.4	71.0	28.6	75.6	28.8	88.3	29.0
100	30	44.5	22.5	57.3	24.4	76.8	25.2	98.8	26.7	101.9	27.0	106.7	27.5	114.5	27.7	126.3	27.8	138.1	27.9
	35	43.2	25.5	55.7	26.2	68.5	27.9	93.7	29.6	99.3	29.9	105.8	30.4	111.5	30.6	122.8	30.7	134.4	31.0
	40	-	-	54.0	28.6	62.8	30.9	86.8	33.2	95.7	33.5	104.9	33.9	108.4	34.1	119.3	34.3	130.5	34.5
	45	-	-	-	-	56.2	33.8	79.6	36.5	91.9	36.9	104.0	37.1	105.1	37.3	115.8	37.4	126.6	37.7
	50	-	-	-	-	53.0	35.6	72.8	39.3	87.5	39.6	102.2	39.9	98.9	40.2	105.2	40.5	122.9	40.7
120	30	51.2	24.0	65.9	26.0	88.3	26.9	113.6	28.5	117.2	28.8	122.7	29.4	131.7	29.6	145.2	29.7	158.8	29.8
	35	49.7	27.2	64.1	28.0	78.8	29.8	107.8	31.6	114.2	31.9	121.7	32.5	128.2	32.6	141.3	32.8	154.6	33.0
	40	42.7	29.8	62.1	30.5	72.2	33.0	99.8	35.4	110.1	35.8	120.6	36.2	124.6	36.4	137.2	36.6	150.0	36.8
	45	0.0	0.0	59.8	34.1	64.6	36.0	91.5	39.0	105.6	39.4	119.6	39.6	120.9	39.8	133.2	39.9	145.6	40.2
	50	0.0	0.0	56.2	36.0	61.0	38.0	83.7	42.0	100.6	42.3	117.5	42.6	113.7	42.9	121.0	43.2	141.3	43.4
150	30	64.2	32.4	82.7	35.1	110.8	36.3	142.5	38.5	147.0	38.9	153.9	39.7	165.2	40.0	182.1	40.1	199.1	40.3
	35	62.3	36.7	80.4	37.8	98.8	40.3	135.2	42.6	143.3	43.1	152.6	43.9	160.8	44.1	177.2	44.3	193.8	44.6
	40	53.5	40.3	77.9	41.2	90.5	44.6	125.1	47.8	138.1	48.3	151.3	48.9	156.3	49.2	172.1	49.5	188.2	49.7
	45	0.0	0.0	75.0	46.0	81.0	48.7	114.8	52.6	132.5	53.2	150.0	53.5	151.6	53.8	167.1	54.0	182.6	54.3
	50	0.0	0.0	70.5	48.7	76.5	51.4	105.0	56.7	126.2	57.2	147.4	57.5	142.6	58.0	151.7	58.4	177.2	58.7

Integrated heating capacity includes the defrost cycles.
Ab. power = Includes compressor and fan consumption.

Table 6. Available pressure for hydraulic circuit YLCA/YLHA 40 ÷ 150 with pack (without filter installed)

Model	Flow l/h	kPa
YLCA/YLHA 40 TP	4 750	261
	5 500	218
	6 250	166
	7 000	105
	7 500	60
	8 000	13
YLCA/YLHA 50 TP	6 500	149
	7 000	142
	7 500	135
	8 000	127
	8 500	119
	9 000	110
	9 500	100
	10 000	90
	10 500	79
	11 000	68
	11 500	56
	12 000	44
YLCA/YLHA 60 TP	7 500	233
	8 000	222
	8 500	210
	9 000	198
	9 500	185
	10 000	172
	10 500	156
	11 000	140
	11 500	122
	12 000	105
	12 500	86
	13 000	67
	13 500	47
YLCA/YLHA 80 TP	9 500	169
	10 000	164
	10 500	159
	11 000	154
	11 500	148
	12 000	143
	12 500	137
	13 000	131
	13 500	124
	14 000	118
	14 500	111
	15 000	103
	15 500	96
	16 000	87
	16 500	79
	17 000	71
	17 500	62
	18 000	53
	18 500	43
	19 000	33
YLCA/YLHA 100 TP	12 000	245
	13 000	236
	14 000	226
	15 000	215
	16 000	201
	17 000	187
	18 000	171
	19 000	153
	20 000	131
	21 000	110
	22 000	87
	23 000	57
	24 000	32
YLCA/YLHA 120 TP	15 000	310
	16 000	295
	17 000	279
	18 000	261
	19 000	241
	20 000	217
	21 000	187
	22 000	157
	23 000	123
	24 000	90
	25 000	55
YLCA/YLHA 150 TP	18 000	249
	19 000	243
	20 000	237
	21 000	230
	22 000	223
	23 000	215
	24 000	207
	25 000	199
	26 000	192
	27 000	183
	28 000	175
	29 000	165
	30 000	155
	31 000	145
	32 000	132
	33 000	120
	34 000	109
	35 000	95
	36 000	84
	37 000	70
	38 000	57

Data with water at 10°C.
In the case of using glycol, apply the correcting factors indicated in Fig. 5 and 6 of the Selection Guide section.

Table 7. Pressure drop in hydraulic circuit YLCA/YLHA 40 ÷ 150 without pack (without filter installed)

Model	Flow l/h	kPa
YLCA/YLHA 40	4 750	37
	5 500	48
	6 250	64
	7 000	81
	7 750	93
	8 500	120
	9 250	138
	10 000	164
	10 750	192
YLCA/YLHA 50	6 500	25
	7 000	28
	7 500	31
	8 000	34
	8 500	37
	9 000	40
	9 500	44
	10 000	48
	10 500	52
	11 000	57
	11 500	62
	12 000	67
	12 500	72
	13 000	77
	13 500	83
	14 000	89
	14 500	95
YLCA/YLHA 60	7 500	36
	8 000	38
	8 500	40.5
	9 000	43
	9 500	45.5
	10 000	48
	10 500	51
	11 000	54
	11 500	57
	12 000	60
	12 500	64
	13 000	68
	13 500	72
	14 000	76
	14 500	81
	15 000	86
	15 500	90.5
	16 000	95
	16 500	100
	17 000	105
YLCA/YLHA 80	9 500	40
	10 000	43
	11 000	48
	12 000	53
	13 000	59
	14 000	65
	15 000	72
	16 000	79
	17 000	87
	18 000	96
	19 000	107
	20 000	119
	21 000	132
	22 000	145
YLCA/YLHA 100	12 000	45
	13 000	46
	14 000	47.5
	15 000	49.5
	16 000	52
	17 000	55
	18 000	60
	19 000	65
	20 000	70
	21 000	75
	22 000	80
	23 000	85
	24 000	92
	-	-
	-	-
	-	-
	-	-
YLCA/YLHA 120	15 000	18
	16 000	20
	17 000	23
	18 000	25.5
	19 000	28
	20 000	31
	21 000	34
	22 000	37
	23 000	40
	24 000	43
	25 000	46
	26 000	49
	27 000	52.5
	28 000	56.5
	29 000	60
	30 000	63
	31 000	67
	32 000	70.5
	33 000	74.5
	34 000	78
YLCA/YLHA 150	18 000	12.5
	19 000	14
	20 000	15.5
	21 000	17.5
	22 000	19.5
	23 000	21.5
	24 000	23.5
	25 000	25.5
	26 000	27.5
	27 000	30
	28 000	32.5
	29 000	35
	30 000	37.5
	31 000	40
	32 000	43
	33 000	46
	34 000	49
	35 000	52
	36 000	55
	37 000	58
	38 000	61
	39 000	64
	40 000	67
	41 000	70
	42 000	73

Table 8. Pressure drop of filters

1 ½" filter

Water flow (l/h)	3 500	4 000	4 500	5 000	5 500	6 000	6 500	7 000	7 500
kPa	1.3	2.6	4	5.4	6.9	8.4	10	11.6	13.3
Water flow (l/h)	8 000	8 500	9 000	9 500	10 000	10 500	11 000	11 500	11 800
kPa	15	16.8	18.7	20.7	22.8	25	27.3	29.7	32

2" filter

Water flow (l/h)	6 000	7 000	8 000	9 000	10 000	11 000	12 000	13 000	14 000	15 000	16 000	17 000	18 000	19 000	20 000
kPa	0.5	0.8	1.1	1.4	1.7	2	2.3	2.6	2.9	3.3	3.7	4.1	4.6	5.1	6

2 ½" filter

Water flow (l/h)	15 000	16 000	17 000	18 000	19 000	20 000	21 000	22 000	23 000	24 000	25 000	26 000	27 000	28 000
kPa	2	2.20	2.40	2.7	3	3.3	3.6	4	4.4	4.8	5.2	5.6	6	6.5
Water flow (l/h)	29 000	30 000	31 000	32 000	33 000	34 000	35 000	36 000	37 000	38 000	39 000	40 000	41 000	42 000
kPa	7	7.5	8	8.5	9	9.7	10.5	11.3	12.1	13	14	15	16	17

Data with water at 10°C.
In the case of using glycol, apply the correcting factors indicated in Fig. 5 and 6 of the Selection Guide section.

Table 9. Correcting factors for other glycol concentrations

% in weight	Ethylene glycol		Propylene glycol	
	Capacity	Absorbed power	Capacity	Absorbed power
10	1.061	1.025	1.097	1.033
20	1.036	1.015	1.067	1.023
30	1.015	1.005	1.026	1.008
35	1	1	1	1
40	0.985	0.995	0.974	0.992
50	0.954	0.985	0.923	0.977

If it is necessary to select different glycol percentages, correct the capacity and absorbed power capacities of tables 2 and 4 (35% ethylene glycol), multiplying them by the coefficients indicated in table 9.

Table 10. Sound power spectrum

Standard models	Frequency (Hz)							dB (A)
	125	250	500	1 000	2 000	4 000	8 000	
YLCA/YLHA 40	84	79	80	75	71	65	59	81
YLCA/YLHA 50	76	80	78	76	71	63	56	84
YLCA/YLHA 60	77	81	83	78	73	64	59	85
YLCA/YLHA 80	78	80	81	79	75	68	63	86
YLCA/YLHA 100	78	80	81	79	75	68	63	86
YLCA/YLHA 120	78	80	81	79	75	68	63	86
YLCA/YLHA 150	75	79	85	77	70	63	55	87

Low noise models	Frequency (Hz)							dB (A)
	125	250	500	1 000	2 000	4 000	8 000	
YLCA/YLHA 40	79	74	75	70	66	60	54	76
YLCA/YLHA 50	71	73	74	67	62	53	48	78
YLCA/YLHA 60	73	75	76	70	65	54	50	80
YLCA/YLHA 80	75	76	77	73	59	58	53	82
YLCA/YLHA 100	75	76	77	73	59	58	53	82
YLCA/YLHA 120	75	76	77	73	59	58	53	82
YLCA/YLHA 150	76	78	79	73	68	59	54	83

Table 11. Gumming coefficients

Evaporating unit		
Gumming coefficient m² °C/kW	Capacity factor	Comp. ab. power coef.
0.044	1.000	1.000
0.088	0.987	0.995
0.176	0.964	0.985
0.352	0.926	0.962

Table 12. Altitude coefficients

Altitude (m.)	Capacity factor	Comp. ab. power coef.
0	1.000	1.000
600	0.987	1.010
1 200	0.973	1.020
1 800	0.958	1.029
2 400	0.943	1.038

Selection guide (YLCA/YLHA)

Necessary information

The following information is needed to select a YLCA/YLHA water chiller:

1. Cooling capacity needed.
2. Design cold water input and output temperatures.
3. Design water flow, if any of the temperatures in above point 2 is unknown.
4. Design input temperature of air to the condensing unit. Normally, this will be the design ambient temperature of summer air, unless influenced by the situation or other factors.
5. Altitude above sea level.
6. Design gumming coefficient of the evaporating unit.

Note: Points 1, 2 and 3 should be related by means of the following formulae:

$$\text{Cooling capacity kW} = \frac{\text{l/h cold water x °C differential}}{860}$$

Selection example

A chiller is required to chill water from 13°C to 7°C, with a cooling capacity of 117 kW.

Here are other design conditions AS WELL:

Ambient air entering the condensing unit: 35°C
Gumming coefficient: 0.044m² °C/kW
Altitude: At sea level

Taking a quick look at Table 1 we can see that a YLCA 120 unit gives an approximate required capacity of 117 kW.
As the factors appearing in Tables 11 and 12 are not applicable, conditions will be as follows:

Cooling capacity: 119 kW
Power consumed: 40 kW
Water temperature: 13°C to 7°C ($\Delta t = 6$)

$$\text{Water flow:} \quad \frac{119 \times 860}{6} = 17\,056 \text{ l/h}$$

Available pressure in hydraulic circuit of a unit with pack (kit).

- From Table 6 we infer that the YLCA 120 TP, with a 17 052 l/h flow, has an available pressure of 279 kPa.

Pressure drop in hydraulic circuit of a unit without pack (kit).

- From Table 7 we infer that the YLCA 120 T, with a 17 056 l/h flow, has a pressure drop of 23 kPa.

Pressure drop in filter.

- From Table 8, 2 ½" filter, we infer that with a 17 056 l/h flow, said filter has a pressure drop of 2.4 kPa.

YLHA selection method

1. Determine the correct size of the YLHA unit by selecting a model from Tables 3, 4 and 5 that is closest to the cooling and heating capacities required in the design conditions of the water outlet and air intake temperatures.
2. Apply gumming correcting factors (Table 11) and altitude (Table 12) to the capacity and power values that appear in the corresponding capacity tables in cool and heat. Make sure the corrected capacity is still sufficient for your needs.
3. Using the corrected capacities of the unit, select the design temperature differential, or the flow.
4. Check to make sure that these selections are within the YLCA/YLHA operating limits.

YLHA selection example

A YLHA heat pump operating at a 35°C ambient temperature should chill water from 13°C to 7°C, with a 112 kW cooling capacity.
A 110 kW heating capacity is required in 5°C design ambient temperature and a hot water output temperature of 45°C.
The gumming coefficient is 0.044 m² °C/kW, with the unit operating at sea level (no corrections).
With a quick glance of capacity Tables 3 and 5, we see that a YLHA 120 heat pump gives the approximate required capacities of:

Cooling capacity	=	114 kW
Total unit absorbed power	=	43.2 kW
Cold water temperature	=	13°C to 7°C ($\Delta t = 6$°C)
Hot and cold water flow	=	16 340 l/h
Heating capacity	=	116.3 kW
Total unit absorbed power in heat mode	=	39.3 kW
Hot water output temperature	=	45°C

$$\text{Hot water temp. differential} = \frac{116.3 \times 860}{16\,340} = 6.10°C$$

Thus, hot water return temperature is = 38.9°C

All values are within operating limits.
- Available pressure in hydraulic circuit of a unit with pack.
- From Table 6 we infer that the YLHA 120, with a 16 340 l/h flow, has an available pressure of 289 kPa.
- Pressure drop in hydraulic circuit of a unit without pack.
- From Table 7 we infer that the YLHA 120, with a 16 340 l/h flow, has a pressure drop of 21 kPa.
- Pressure drop in filter.
- From Table 8, 2 1/2" filter, we infer that with a 16 340 l/h flow, said filter has a pressure drop of 2.2 kPa.

Selection guide with glycol (cool only units)

Necessary information

The following information is needed to select a YLCA water chiller:
1. Cooling capacity needed.
2. Design cold water/glycol input and output temperatures to and from the condensing unit.
3. Design water/glycol flow.
4. Design input temperature of air to condensing unit. Normally, this will be the design ambient temperature of summer air, unless influenced by the situation or other factors.
5. Altitude above sea level.
6. Design gumming coefficient of the evaporating unit.

Note: Points 1, 2 and 3 should be related by means of the following formulae:

$$\text{Capacity (kW)} = \frac{\Delta t\ (°C) \times \text{Flow (litres/second)}}{\text{Glycol factor}}$$

In which Δt = liquid intake temp. - liquid output temp.

To determine the glycol factor, please see Figure 1 for ethylene glycol, or Figure 3 for propylene glycol. For design output temperature, please see the recommended glycol concentration and the glycol factor in this concentration. This is the minimum concentration to be used for design output temperature. If a greater concentration is required, the glycol factor can be determined by means of Figure 2 on ethylene glycol or Figure 4 on propylene glycol.

Selection method

1. Determine the correct chiller model by selecting the one that is closest to the capacities required by the design conditions of the glycol outlet and air intake temperatures.

2. Apply the gumming correcting factors that correspond to the gumming coefficient, altitude and glycol concentration, to the capacity and power values in the capacity tables. Make sure the corrected capacity is still sufficient for your needs.

3. Using the corrected capacities of the chiller, set the design temperature range, or the flow, to balance the formulae appearing in the "Necessary information" section.

4. Always recheck to make sure these selections are within the specified design limits.

Selection example

A chiller is required to chill ethylene glycol from 1 to -4°C, with a capacity of 75 kW.

The following design conditions are applicable:

Gumming coefficient:	0.088m² °C/kW
Altitude:	1 200 m
Ambient air:	25°C
Concentration of glycol:	30% w/w

For a -4°C ethylene glycol output, the concentration recommended in Figure 1 is 30%. Therefore, the specified concentration is appropriate.

From Table 2 (capacities with 35% glycol) we infer that a YLCA-120 unit, at the established design conditions, gives a capacity of 80.2 kW and a consumption of 26.6 kW.

With the design gumming coefficient, use the capacity correcting factors x 0.987 and power x 0.995 (Table 11).

On design altitude, apply the capacity correcting factors x 9.973 and power x 1.020 (Table 12).

On design glycol concentration, apply the capacity correcting factors x 1.015 and power x 1.005 (Table 9).

Applying these factors to the selection: YLCA-120

Capacity = 80.2 x 0.987 x 0.973 x 1.015 = 78.1 kW

Comp. power = 26.6 x 0.995 x 1.020 x 1.005 = 27 kW

For the specified glycol concentration and a -4°C output temperature, Figure 3 shows a 0.248 glycol factor. Thus, the flow can be determined with the formula appearing in the "Necessary information" section.

$$78.1\ \text{kW} = \frac{(1 - (-4)) \times \text{Flow (l/s)}}{0.248}$$

$$\text{Flow} = \frac{78.1 \times 0.248}{5} = 3.87\ \text{(l/s) or } 13\,945\ \text{(l/h)}$$

This covers the limits of use.
The evaporating unit pressure drop can be determined by

taking the water pressure drop value (Table _) for a YLCA 120 unit and multiplying it by the correcting factor (see Fig. 5) for a 30% concentration and an average temperature of -1.5°C, that is to say $\frac{1 + (-4).}{2}$

16 kPa x 1.22 = 19.5 kPa.

Fig. 1 - Recommended ethylene glycol concentrations

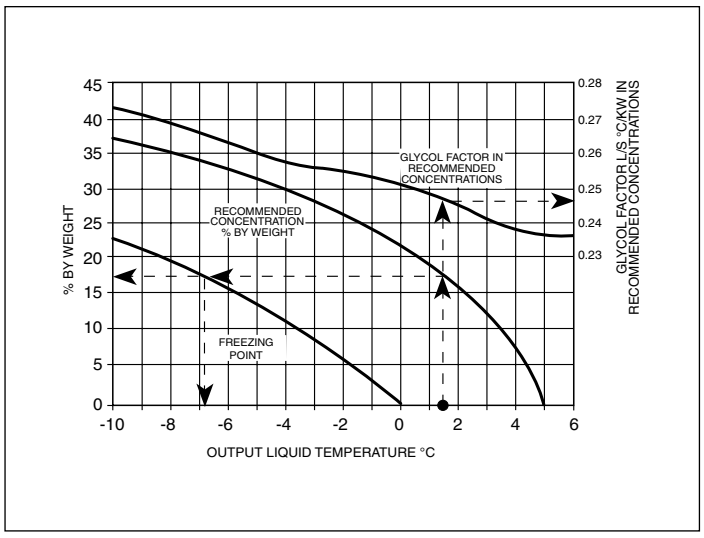

% BY WEIGHT
GLYCOL FACTOR L/S °C/KW IN RECOMMENDED CONCENTRATIONS
GLYCOL FACTOR IN RECOMMENDED CONCENTRATIONS
RECOMMENDED CONCENTRATION % BY WEIGHT
FREEZING POINT
OUTPUT LIQUID TEMPERATURE °C

Fig. 2 - Ethylene glycol in other concentrations

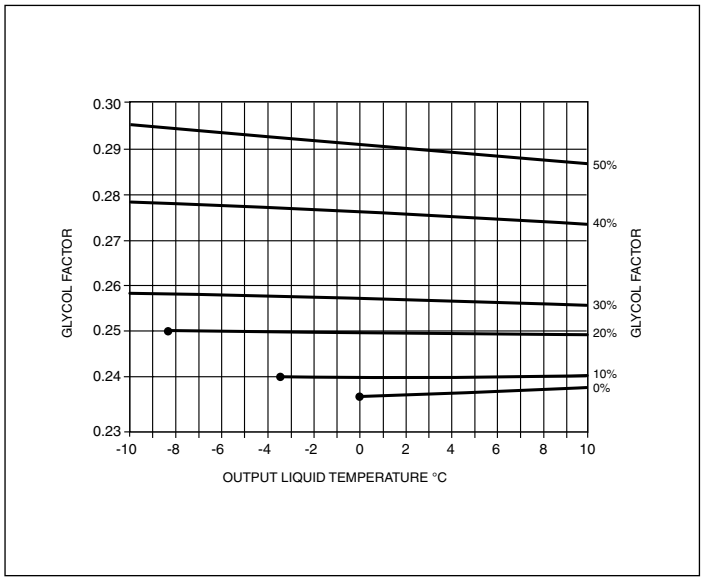


Fig. 3 - Recommended propylene glycol concentrations

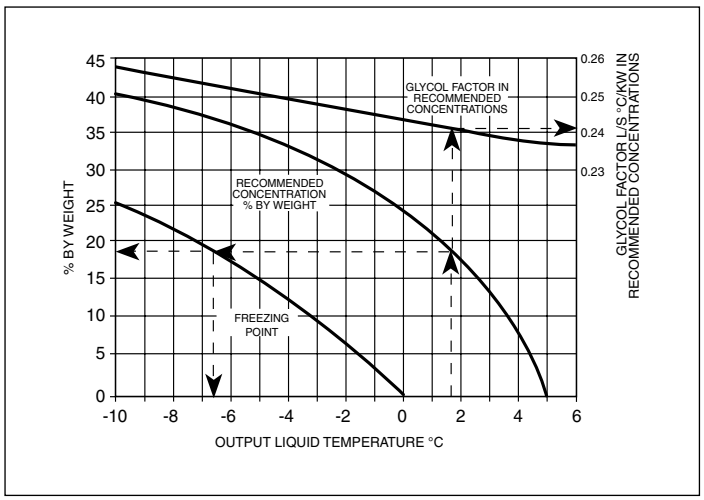

% BY WEIGHT
GLYCOL FACTOR L/S °C/KW IN RECOMMENDED CONCENTRATIONS
GLYCOL FACTOR IN RECOMMENDED CONCENTRATIONS
RECOMMENDED CONCENTRATION % BY WEIGHT
FREEZING POINT
OUTPUT LIQUID TEMPERATURE °C

Fig. 4 - Propylene glycol in other concentrations

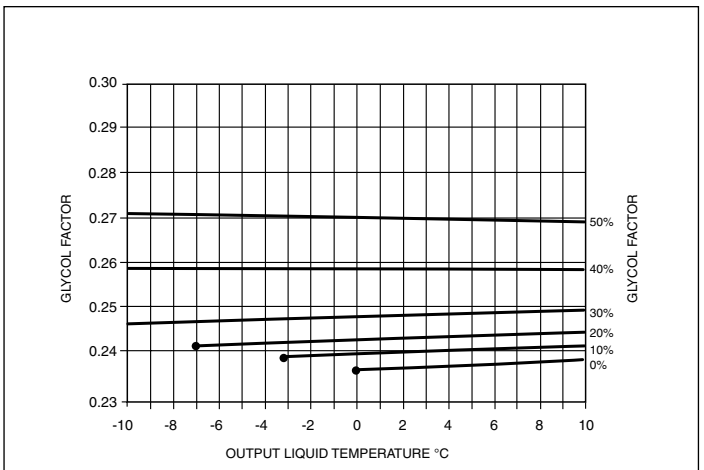


Fig. 5 - Ethylene glycol pressure drop correcting factor

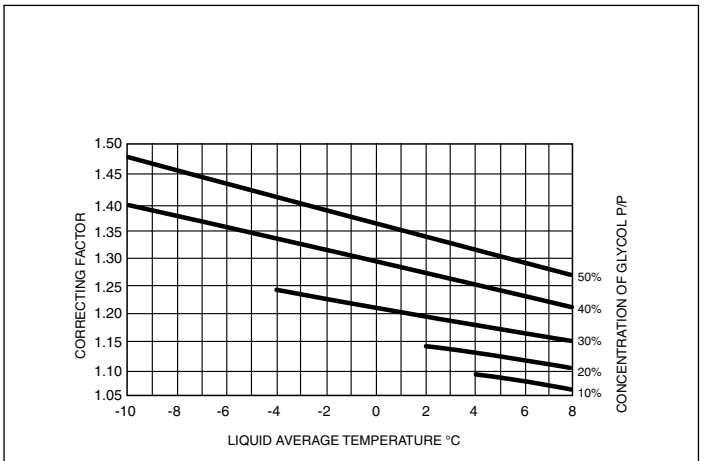
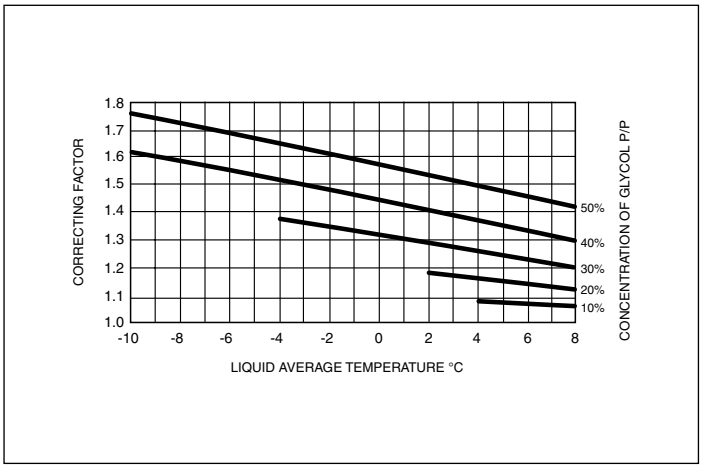


Fig. 6 - Propylene glycol pressure drop correcting factor



Installation instructions

Inspection

Upon reception, inspect the goods and notify the carrier and the insurance company, in writing, of any possible damage during transportation.

Environmental protection

Packing

Packing is made of recyclable material. Its elimination should be carried out in accordance with local regulations on selective collection of residual material.

Refrigerant

Contains greenhouse effect fluorided gas covered by the Kyoto protocol.

For the type of gas and quantity per system, see the identification plate.

GWP (Global Warming Potential) : 2088.

Elimination of the unit

Upon disassembly of the unit, the components should be recuperated ecologically. The cooling circuit is full of refrigerant that should be recuperated and returned to the gas manufacturer for recycling.

Oil will remain in the hermetic compressor and, therefore, must be returned with the circuit sealed.

The air conditioning unit will be deposited in an area determined by the local authorities, for its selective recuperation.

Safety

Installation and maintenance servicing of this air conditioning system should be carried out by qualified and expert personnel. Maintenance servicing, such as cleaning coils and air filters, should be carried out regularly to maintain optimum performance of the units.

CAUTION

This unit should be installed and used in compliance with:

- Low voltage electro technical regulations.
- Safety regulations for cooling plants and installations.
- Pressure device regulations.
- Basic building regulations.
- Local regulations.

Transportation

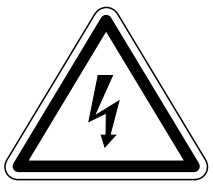
The units should always be transported in vertical position so as to avoid oil leaking out of the compressor. If, for any reason, this position need be changed sporadically, they will remain in that position a strictly necessary period of time only.

Handling

The unit should be handled using the metal rails supplied for fastening and transportation.

Warning signs

The following signs indicate the existence of potentially dangerous conditions for users or servicing personnel. Whenever found on the unit, take the meaning of each one into account.



This symbol indicates an electrical danger or risk.

Caution: The unit is equipped with remote control system and can start automatically. Before accessing the interior, disconnect the power supply so as to avoid any contact with the fan turbine in motion.

Caution: Fan in operation.

Caution: It is obligatory to read the instructions prior to any handling.

Caution: Do not touch hot surfaces.

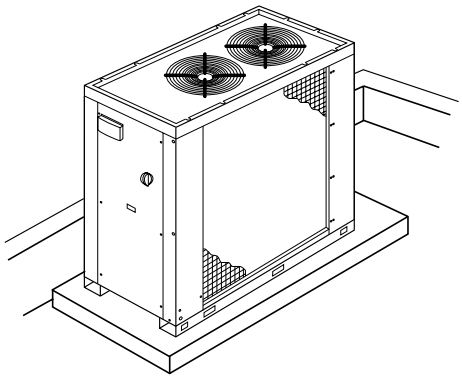
Caution: Possible gas leak due to inadequate handling.

Location

Before locating the unit, make sure you have received the appropriate product by checking the specifications described on the outside of same.
The unit should be placed on a perfectly horizontal plane, making sure the base can support the weight of the unit.
If vibration-free operation is required, the unit can be placed on a cork or similar anti-vibratory base, or fastened to the base with anti-vibratory plates or supports.

Fastening the unit

Before installing the unit, make sure the structure can support the weight of same.
If the unit is to be placed on the floor, a concrete base should be prepared so as to distribute weight evenly.



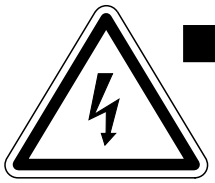
Clearances

When installing each unit, clearances should be left for:
a) Air intake and discharge.
b) Maintenance servicing.
c) Power supply connections.
For proper operation, all minimum clearances shown on the general dimension diagrams should be respected always with regard to possible obstruction of air circulation of the work of a user.

Wiring

Electrical connections

All **established national regulations** should be complied.
Each unit is supplied with a control box to which the power supply will be connected through a fused main switch or an automatic switch.



WARNING

Loose cables can cause overheating of terminals or incorrect operation of the unit. Fire hazards may also exist. Therefore, make sure all cables are connected firmly.

Rotational direction of Scroll compressors

The Scroll compressors operate correctly in one single rotational direction. Although these units are protected by a phase order detector, when starting the equipment make sure the rotational direction is correct.
If it is not correct:
- The compressor does not compress.
- It makes a strange sound.
- Amperage consumption is limited.
- It overheats in excess.

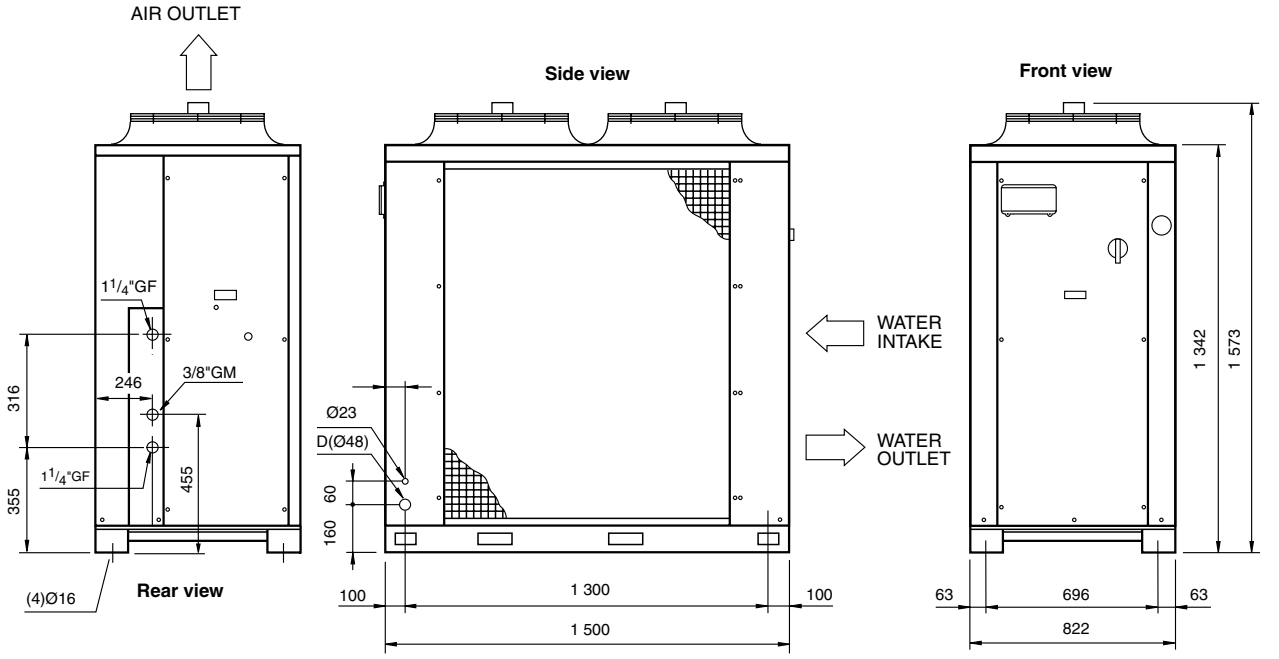
The phase detector must have both LEDs on for correct operation.
- Green LED on means: Power ON.
- Yellow LED on means: Relay ON.

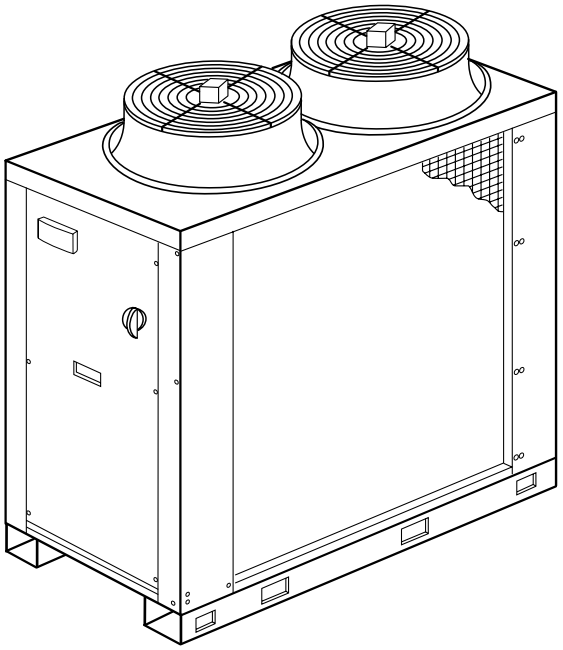
Hydraulic connections

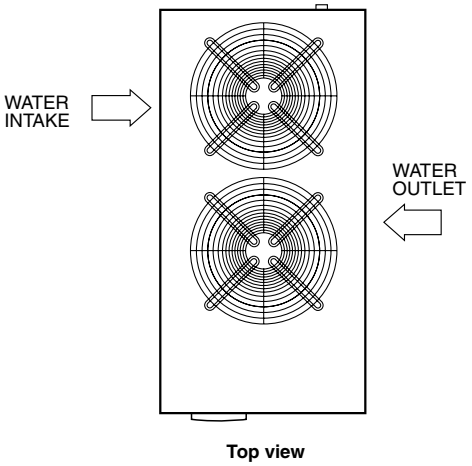
The hydraulic connections of the water intake and outlet of the unit should be carried out respecting the intake and outlet directions indicated.
A galvanised iron or copper tubing can be used, with dimensions no lower than those indicated, and keeping in mind the pressure drops at said connections and in the internal exchanger of the installation.
Pump dimensioning should be carried out in accordance with a nominal flow that allows an Δt within the operating limits.
In all cases, a flow switch should be installed so as to avoid the possibility of operation without water flow.
An adequate expansion vessel for the total volume of the water in the installation should also be installed in the water return tubing.
During the winter season, with outdoor temperatures below 0°C, take precautions to avoid freezing of the water in the tubing network.
Usually, a filling solution is applied the circuit with an anti-freeze mixture (glycol).

General dimensions and hydraulic connections

YLCA/YLHA 40

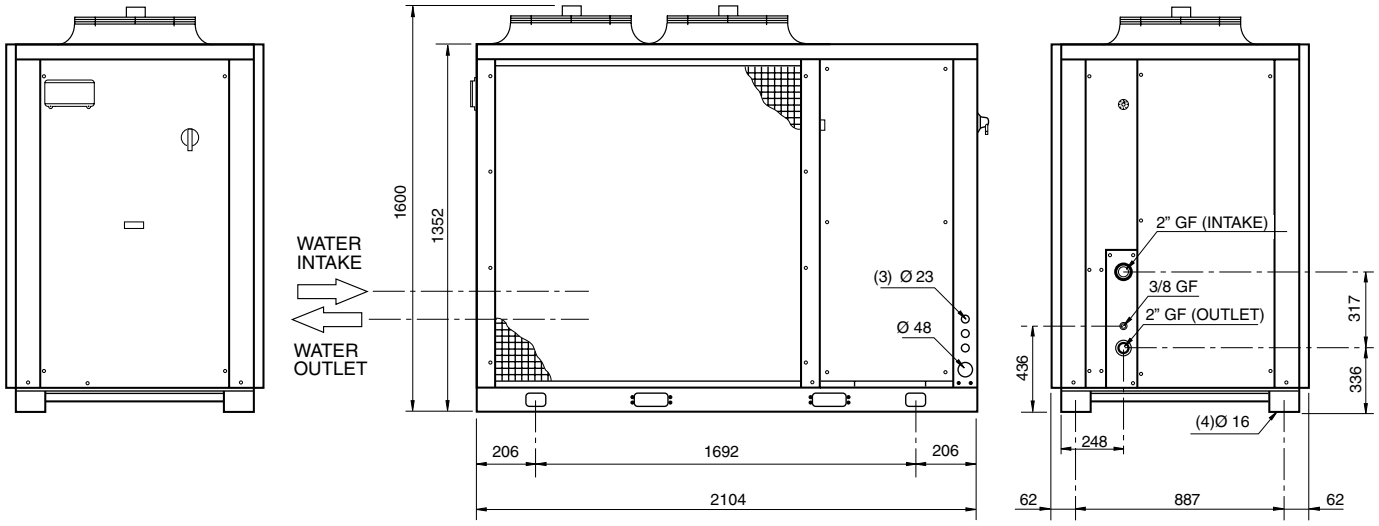


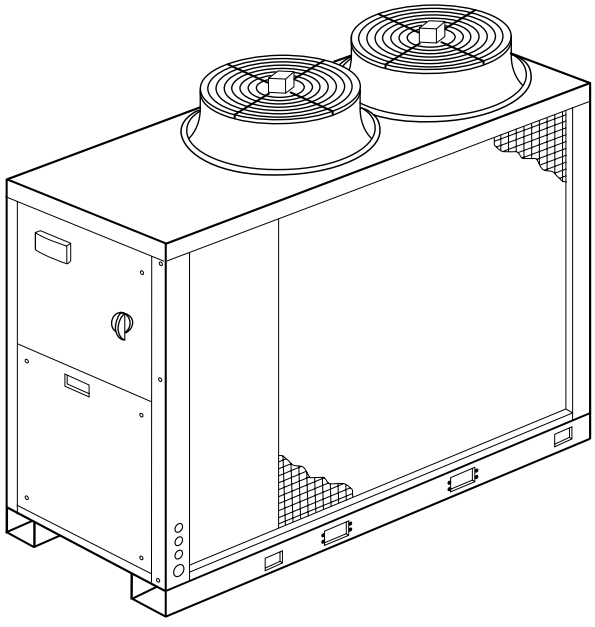


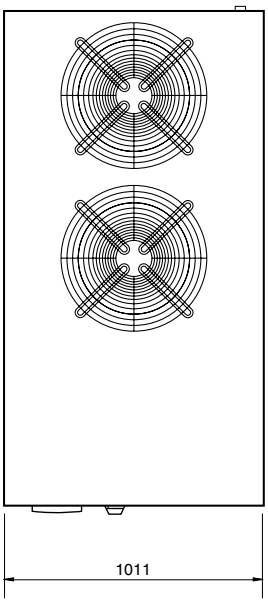


General dimensions and hydraulic connections

YLCA/YLHA 50 and 60

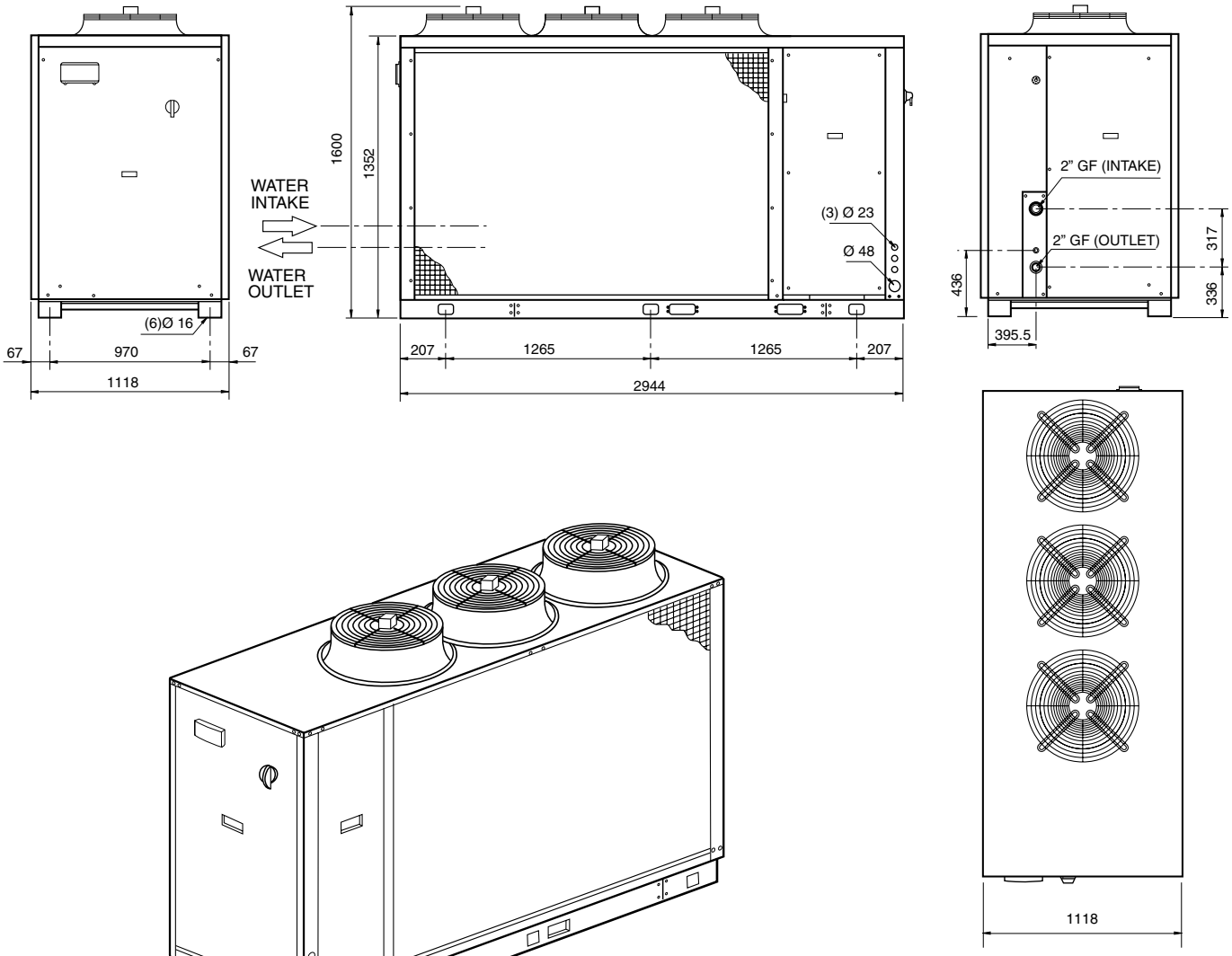






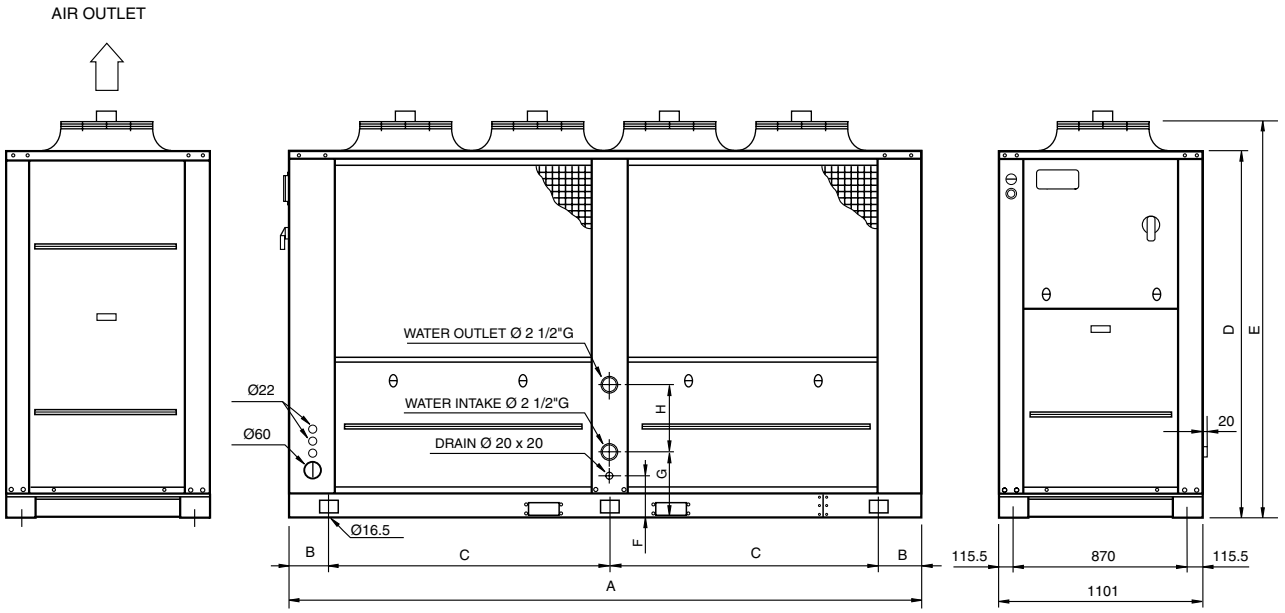
General dimensions and hydraulic connections

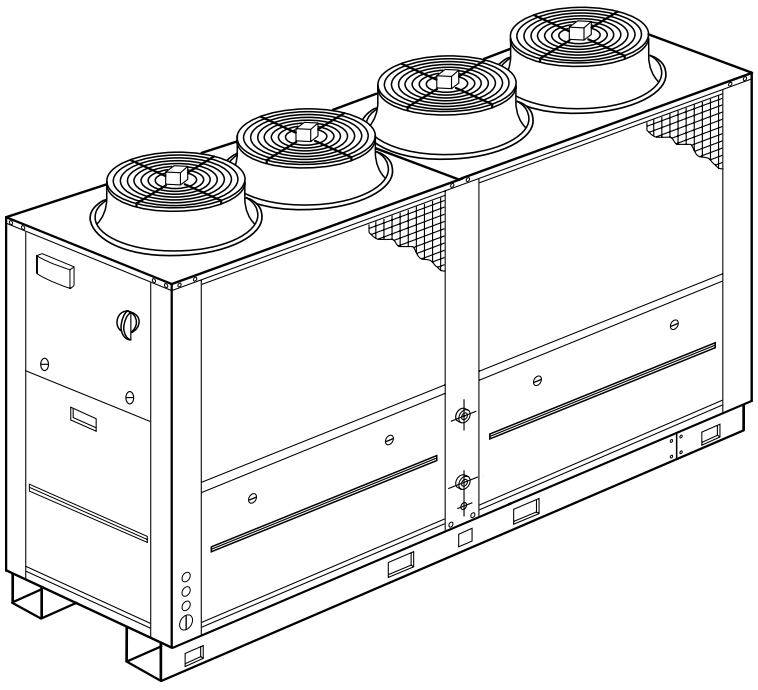
YLCA/YLHA 80

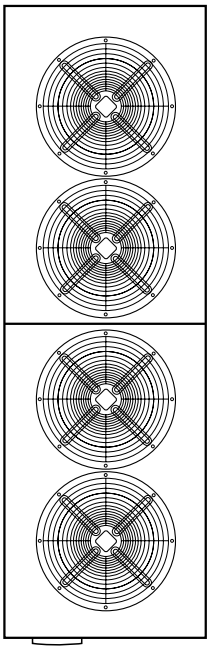


General dimensions and hydraulic connections

YLCA/YLHA 100, 120 and 150

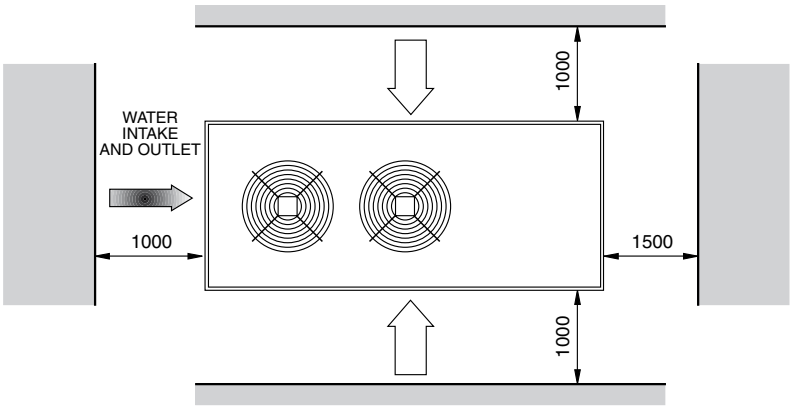


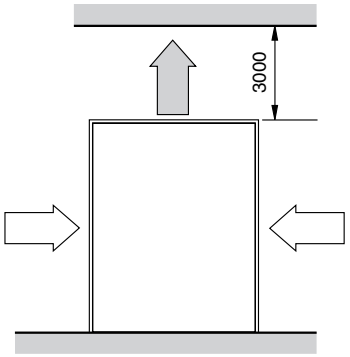


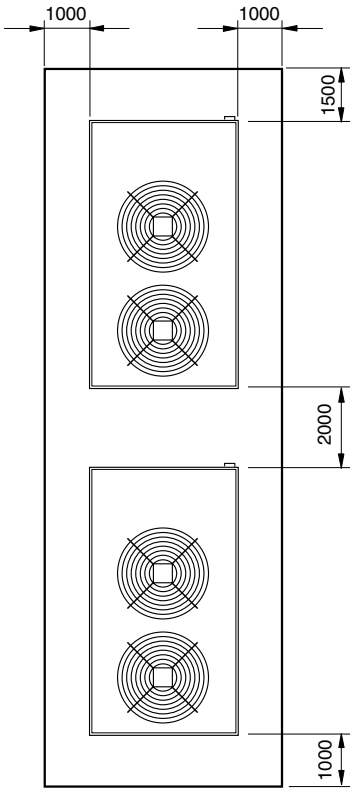


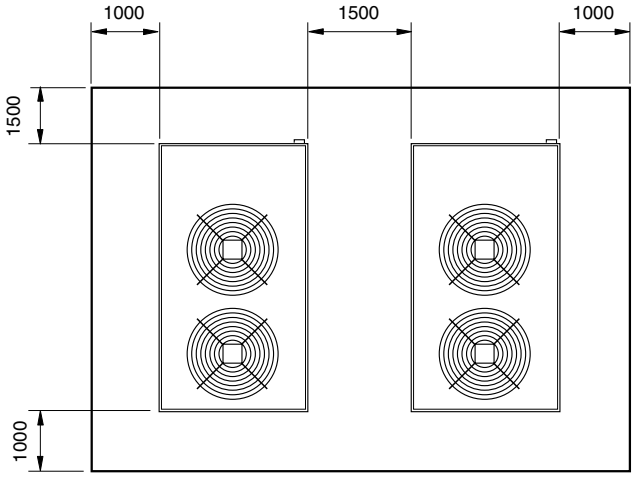
Model	A	B	C	D	E	F	G	H
YLCA/YLHA 100 & 120	3 416	183	1 525	1 942	2 190	199	289	380
YLCA/YLHA 150	3 770	255	1 630	1993	2 263	145	211	458

Minimum technical clearances YLCA/YLHA 40 ÷ 80

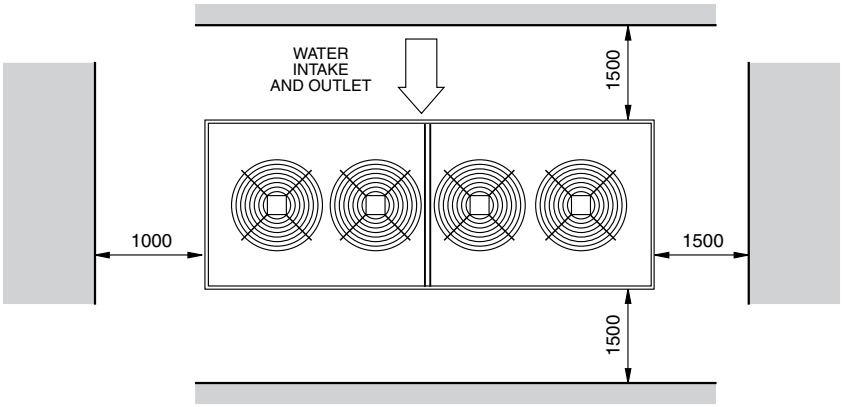


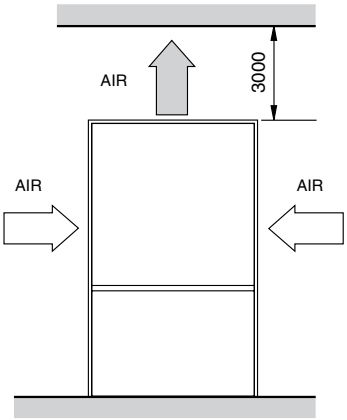


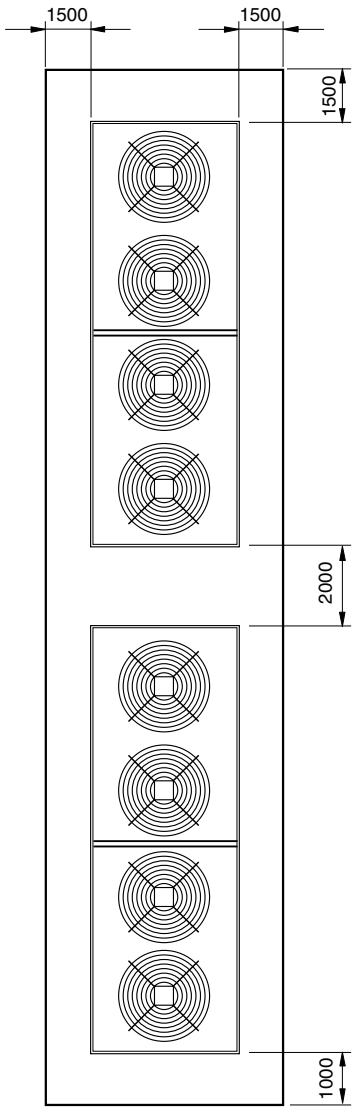


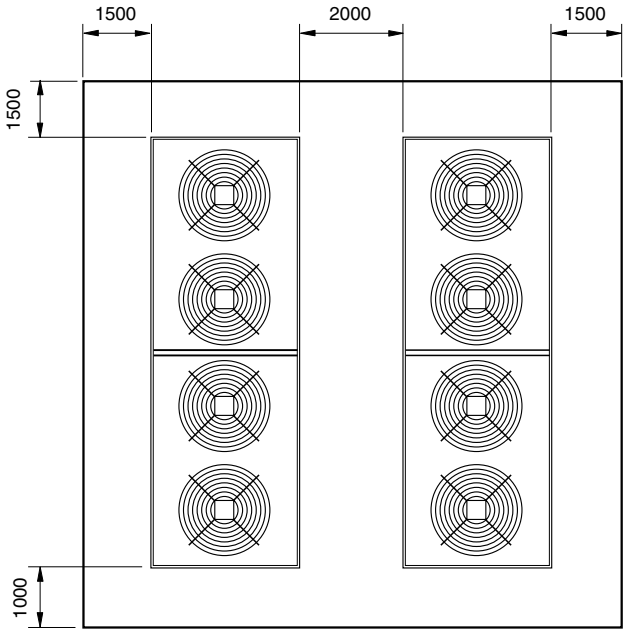


Minimum technical clearances YLCA/YLHA 100 ÷ 150

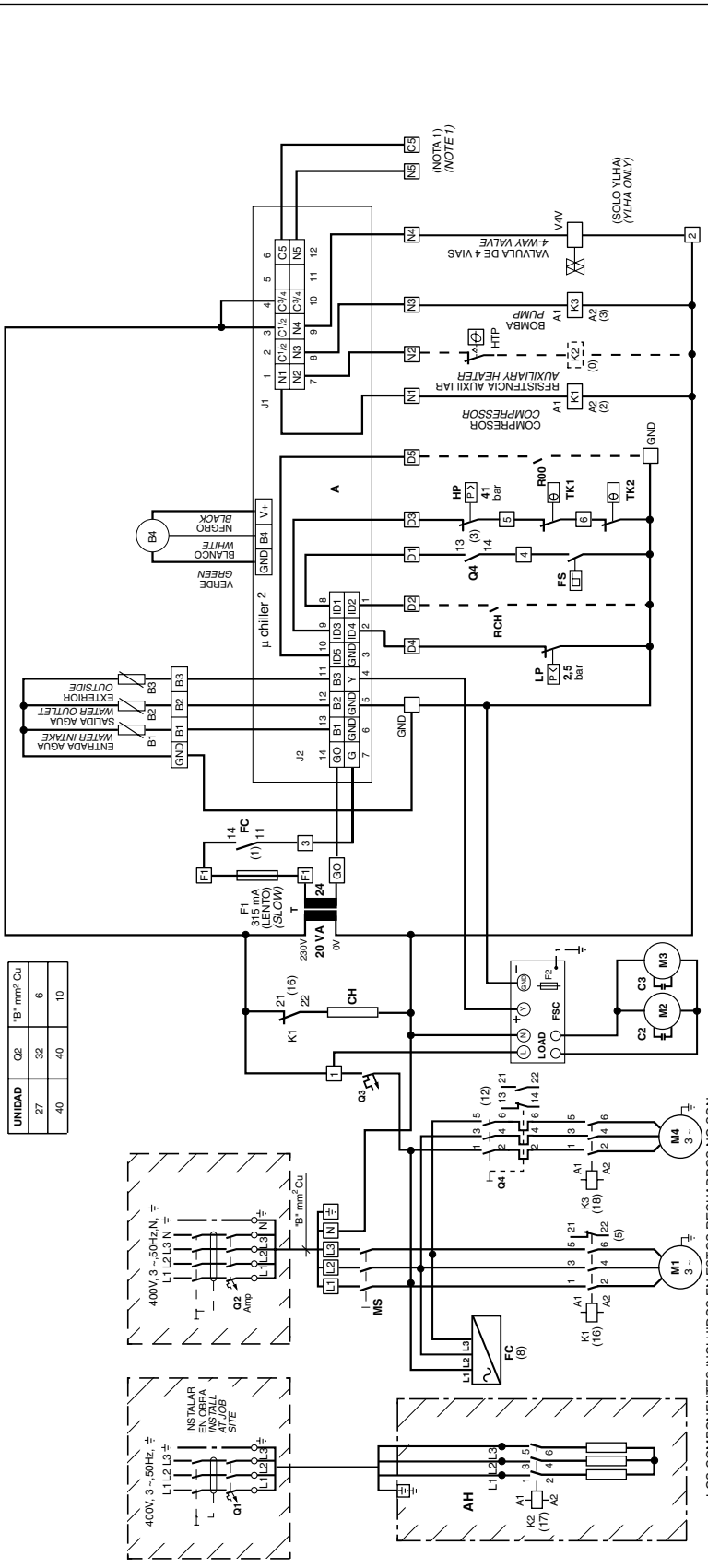








Wiring diagram, YLCA/YLHA 40, 400.3.50



UNIDAD	Q2	"B" mm² Cu
27	32	6
40	40	10

I-2565d
YLCA/YLHA 27..40 TC and T
YLHA PLUS 27
400.3.50

NOTAS: *NOTES:*

1.- ALARMA. CONTACTO NORMALMENTE ABIERTO LIBRE DE TENSIÓN (3A.RESISTIVOS MAXIMO)
ALARM.CONTACT NORMALLY OPEN, VOLT-FREE (3A. MAXIMUM RESISTANCE.)

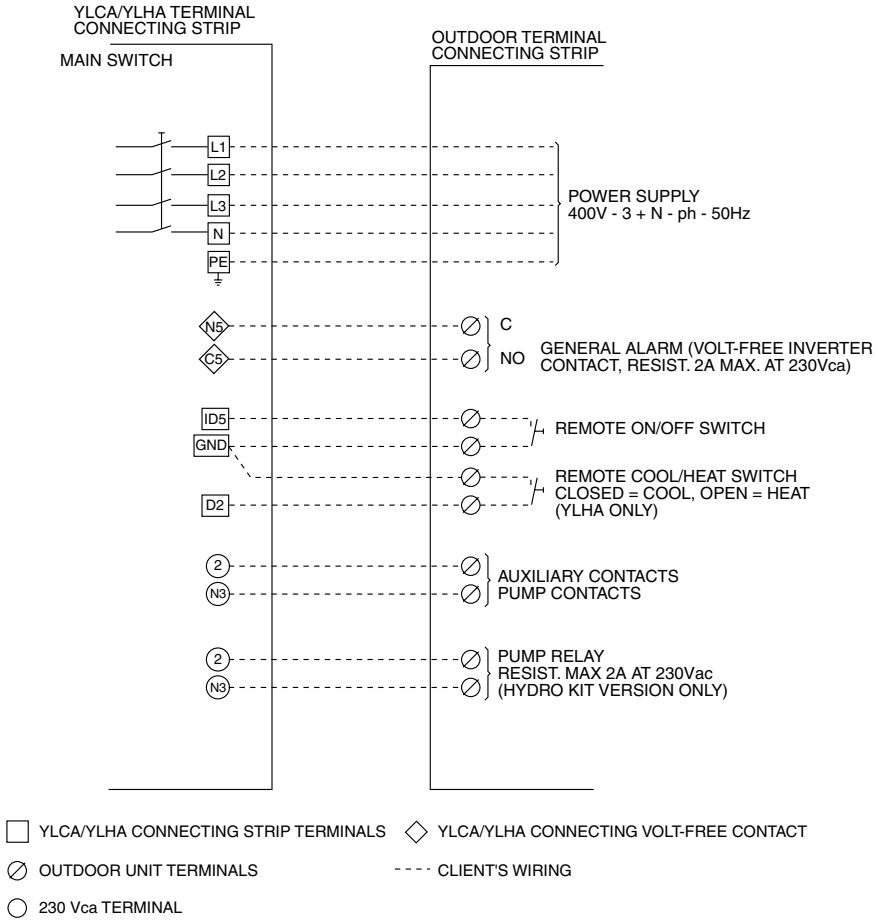
2.- SOLO UNIDADES TC
TC UNITS ONLY

LOS COMPONENTES INCLUIDOS EN ESTOS RECUADROS NO SON SUMINISTRADOS POR EL FABRICANTE
THE COMPONENTS INCLUDED IN THESE BOXES ARE NOT SUPPLIED BY THE MANUFACTURER.

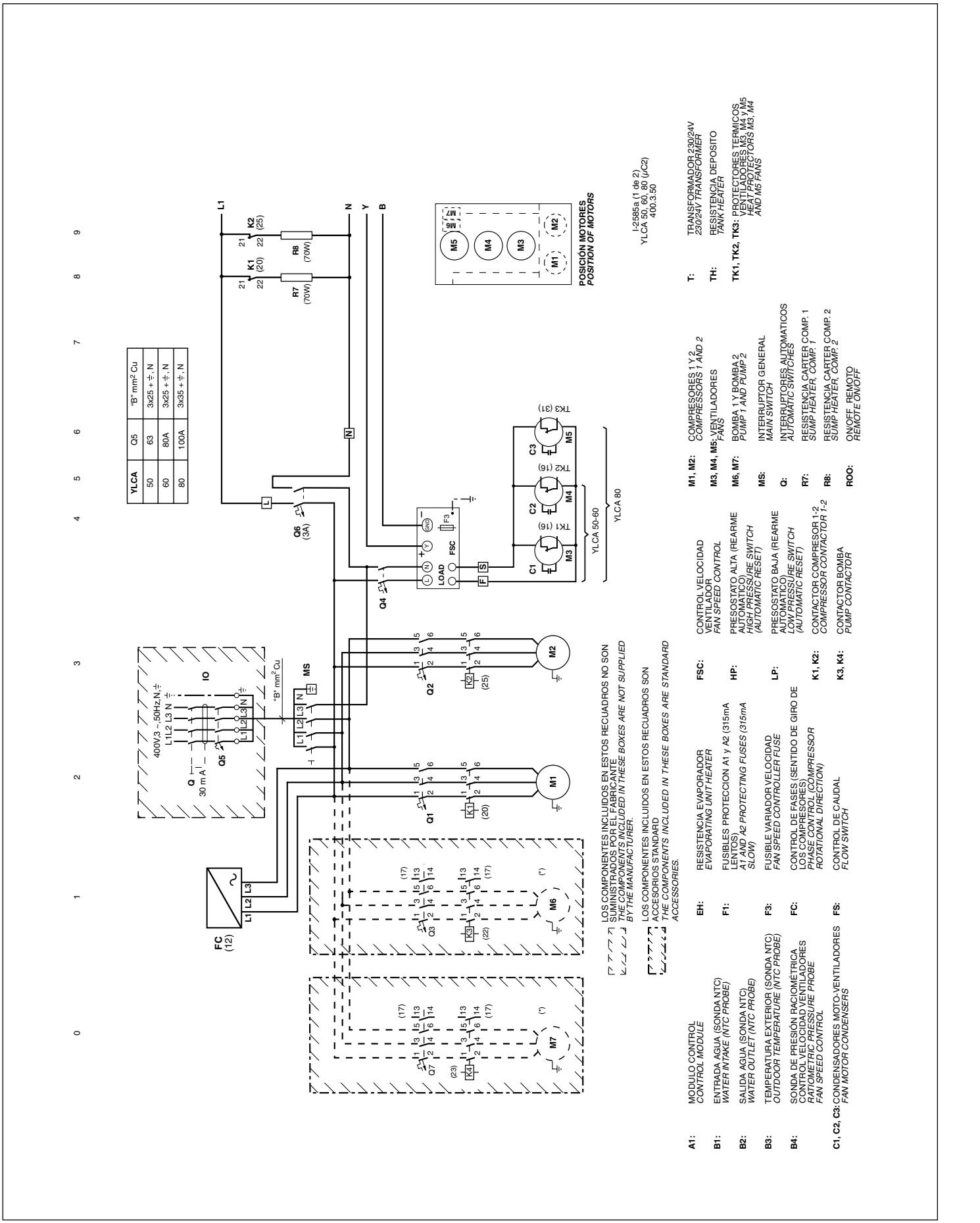
LOS COMPONENTES INCLUIDOS EN ESTOS RECUADROS SON ACCESORIOS STANDARD SUMINISTRADOS POR EL FABRICANTE
THE COMPONENTS INCLUDED IN THESE BOXES ARE STANDARD ACCESSORIES SUPPLIED BY THE MANUFACTURER.

A	CONTROL ELECTRÓNICO *ELECTRONIC CONTROL*	**F1**	FUSIBLE PROTECCIÓN CONTROL ELECTRONICO / MANIOBRA 24V *24V ELECTRONIC CONTROL FUSE*	**K2**	CONTACTOR RESISTENCIA AUXILIAR *AUXILIARY HEATER CONTACTOR*	**Q1**	PROTECTOR MAGNETOTÉRMICO RESISTENCIA APOYO *BACKUP HEATER MAGNETO THERMAL PROTECTOR*
AH	RESISTENCIA AUXILIAR *AUXILIARY HEATER*	**F2**	FUSIBLE PROTECCIÓN VARIADOR DE VELOCIDAD VENTILADOR *FAN SPEED CONTROLLER FUSE*	**K3**	CONTACTOR BOMBA (UNIDADES TC) *PUMP CONTACTOR (TC UNITS)*	**Q2**	PROTECTOR MAGNETOTÉRMICO GENERAL COMPRESOR *MAIN MAGNETO THERMAL PROTECTOR, COMPRESSOR*
B1	SONDA TEMPERATURA ENTRADA AGUA (NTC) *WATER INTAKE TEMPERATURE PROBE (NTC)*	**FC**	CONTROL DE FASES *PHASE CONTROL*	**LAK**	ACCESORIO LOW AMBIENT KIT PRESOSTATICO *LOW AMBIENT KIT, ACCESSORY*	**Q3**	PROTECTOR MAGNETOTÉRMICO MANIOBRA GENERAL 230V / VENTILADOR / BOMBA / RESISTENCIA CARTER *MAIN MAGNETO THERMAL PROTECTOR, 220V/FAN/PUMP.*
B2	SONDA TEMPERATURA SALIDA AGUA (NTC) *WATER OUTLET TEMPERATURE PROBE (NTC)*	**FS**	CONTROL CAUDAL DE AGUA (UNIDADES TC) *WATER FLOW SWITCH (TC UNITS)*	**LP**	PRESOSTATO BAJA 2,5 BAR *LOW PRESSURE SWITCH, 2.5 BAR*	**M1**	COMPRESOR *COMPRESSOR*
B3	SONDA TEMPERATURA EXTERIOR (NTC) *OUTSIDE TEMPERATURE PROBE (NTC)*	**FSC**	VARIADOR VELOCIDAD VENTILADOR *FAN SPEED CONTROLLER*	**M2**	VENTILADOR 1 *FAN 1*	**Q4**	PROTECTOR MAGNETOTÉRMICO BOMBA (UNIDADES TC) *UMP MAGNETO THERMAL PROTECTOR (TC UNITS)*
B4	SONDA DE PRESIÓN RACIOMÉTRICA CONTROL VELOCIDAD VENTILADORES/ DESESCARCHES *RATIOMETRIC PRESSURE PROBE FAN SPEED CONTROL DEFROSTS (ACCESSORY)*	**HP**	PRESOSTATO ALTA 41 BAR *HIGH PRESSURE SWITCH, 41 BAR*	**M3**	VENTILADOR 2 *FAN 2*	**R00**	SELECTOR REMOTO PARO / MARCHA *ON/OFF REMOTE CONTROL*
C2, C3	CONDENSADOR VENTILADOR *FAN CONDENSER*	**HTP**	PROTECTOR TÉRMICO RESISTENCIA *HEATER THERMAL PROTECTION*	**M4**	BOMBA (UNIDADES TC) *PUMP (TC UNITS)*	**RCH**	SELECTOR REMOTO FRIO / CALOR *COOL/HEAT REMOTE CONTROL*
CH	RESISTENCIA CARTER COMPRESOR *COMPRESSOR SUMP HEATER*	**K1**	CONTACTOR COMPRESOR *COMPRESSOR CONTACTOR*	**MS**	INTERRUPTOR GENERAL *MAIN SWITCH*	**T**	TRANSFORMADOR 230 / 24V 20VA *230 / 24V 20VA TRANSFORMER*
						TK1, TK2	PROTECTOR TÉRMICO VENTILADOR *FAN HEAT SWITCH*
						V4V	VALVULA DE 4 VIAS *4-WAY VALVE*

Wiring, YLCA/YLHA 40



Wiring diagram, YLCA 50, 60 and 80 (µC2), 400.3.50 (1/2)

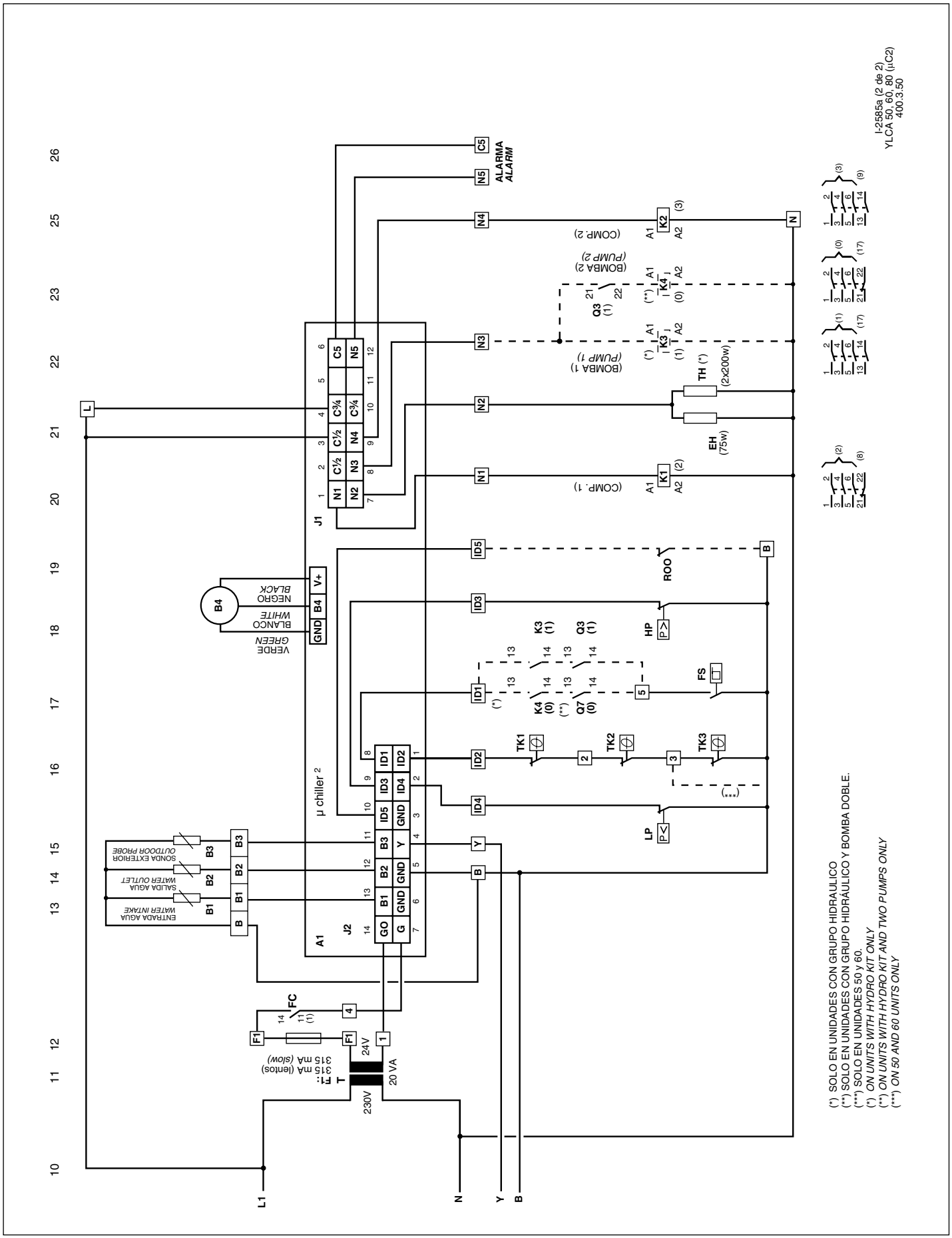


LOS COMPONENTES INCLUIDOS EN ESTOS RECUADROS NO SON SUMINISTRADOS POR EL FABRICANTE
THE COMPONENTS INCLUDED IN THESE BOXES ARE NOT SUPPLIED BY THE MANUFACTURER.

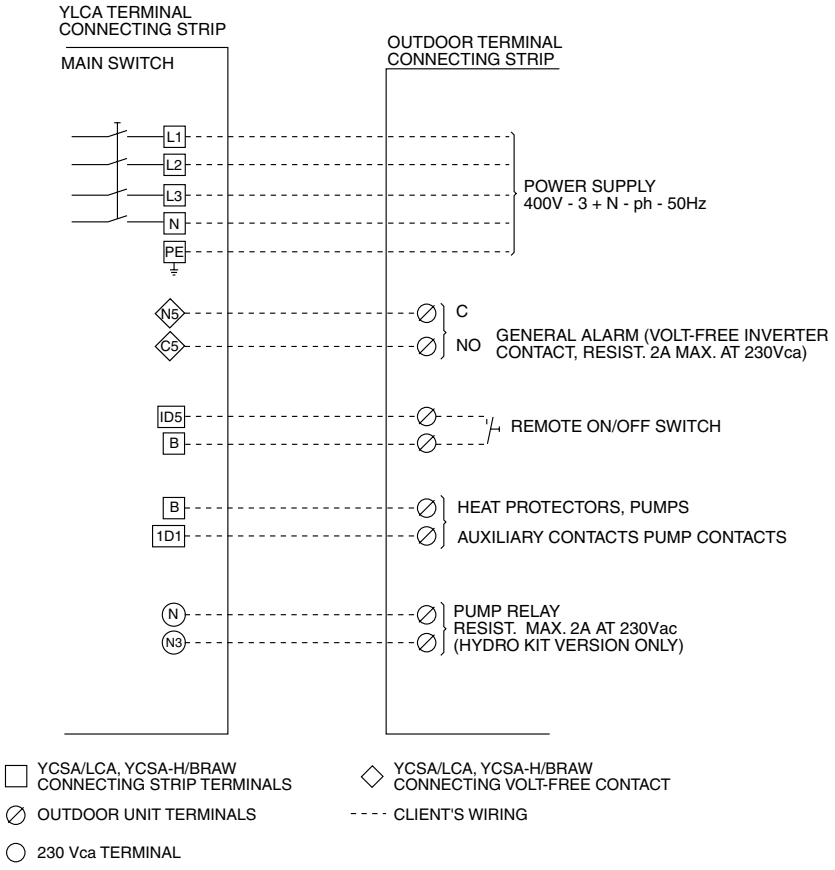
LOS COMPONENTES INCLUIDOS EN ESTOS RECUADROS SON ACCESORIOS STANDARD
THE COMPONENTS INCLUDED IN THESE BOXES ARE STANDARD ACCESSORIES.

A1: MODULO CONTROL / *CONTROL MODULE*
B1: ENTRADA AGUA (SONDA NTC) / *WATER INTAKE (NTC PROBE)*
B2: SALIDA AGUA (SONDA NTC) / *WATER OUTLET (NTC PROBE)*
B3: TEMPERATURA EXTERIOR (SONDA NTC) / *OUTDOOR TEMPERATURE (NTC PROBE)*
B4: SONDA DE PRESION RACIOMÉTRICA CONTROL VELOCIDAD VENTILADORES / *RATIOMETRIC PRESSURE PROBE FAN SPEED CONTROL*
C1, C2, C3: CONDENSADORES MOTO-VENTILADORES / *FAN MOTOR CONDENSERS*
EH: RESISTENCIA EVAPORADOR / *EVAPORATING UNIT HEATER*
F1: FUSIBLES PROTECCION A1 y A2 (315mA LENTOS) / *A1 AND A2 PROTECTING FUSES (315mA SLOW)*
F3: FUSIBLE VARIADOR VELOCIDAD / *FAN SPEED CONTROLLER FUSE*
FC: CONTROL DE FASES (SENTIDO DE GIRO DE LOS COMPRESORES) / *PHASE CONTROL (COMPRESSOR ROTATIONAL DIRECTION)*
FS: CONTROL DE CAUDAL / *FLOW SWITCH*
FSC: CONTROL VELOCIDAD VENTILADOR / *FAN SPEED CONTROL*
HP: PRESOSTATO ALTA (REARME AUTOMATICO) / *HIGH PRESSURE SWITCH (AUTOMATIC RESET)*
LP: PRESOSTATO BAJA (REARME AUTOMATICO) / *LOW PRESSURE SWITCH (AUTOMATIC RESET)*
K1, K2: CONTACTOR COMPRESOR 1-2 / *COMPRESSOR CONTACTOR 1-2*
K3, K4: CONTACTOR BOMBA / *PUMP CONTACTOR*
M1, M2: COMPRESORES 1 Y 2 / *COMPRESSORS 1 AND 2*
M3, M4, M5: VENTILADORES / *FANS*
M6, M7: BOMBA 1 Y BOMBA 2 / *PUMP 1 AND PUMP 2*
MS: INTERRUPTOR GENERAL / *MAIN SWITCH*
Q: INTERRUPTORES AUTOMATICOS / *AUTOMATIC SWITCHES*
R7: RESISTENCIA CARTER COMP. 1 / *SUMP HEATER, COMP. 1*
R8: RESISTENCIA CARTER COMP. 2 / *SUMP HEATER, COMP. 2*
ROO: ON/OFF REMOTO / *REMOTE ON/OFF*
T: TRANSFORMADOR 230/24V / *230/24V TRANSFORMER*
TH: RESISTENCIA DEPOSITO / *TANK HEATER*
TK1, TK2, TK3: PROTECTORES TERMICOS VENTILADORES M3, M4 Y M5 / *FAN MOTOR PROTECTORS M3, M4 AND M5 FANS*

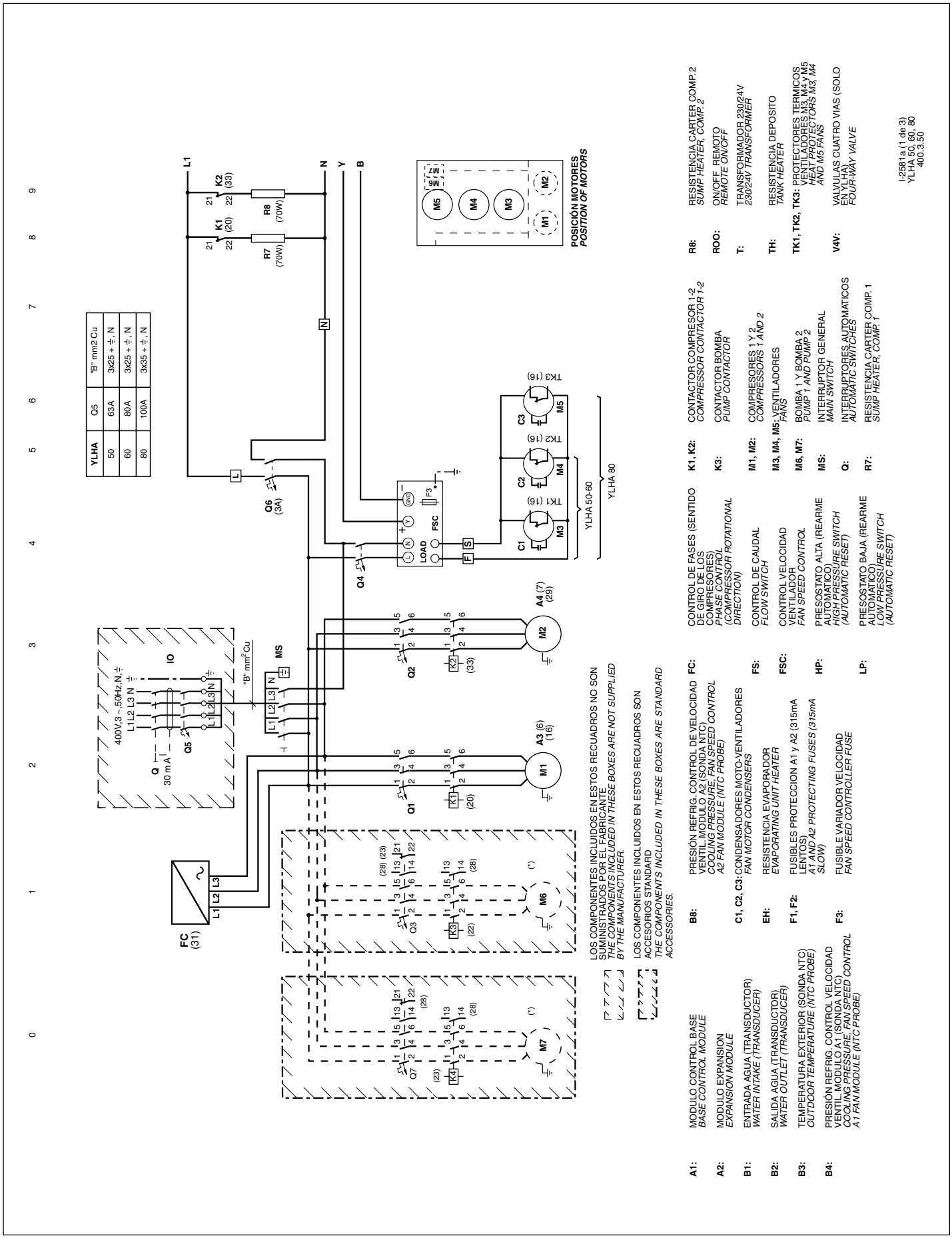
Wiring diagram, YLCA 50, 60 and 80 (µC2), 400.3.50 (2/2)



Wiring, YLCA 50, 60 and 80



Wiring diagram, YLHA 50, 60 and 80 (µC2), 400.3.50 (1/3)


YLHA | Q5 | "B" mm2 Cu
50 | 63A | 3x25 + ⏚, N
60 | 80A | 3x25 + ⏚, N
80 | 100A | 3x35 + ⏚, N
400V.3 ~ 50Hz, N, ⏚
L1 L2 L3 N ⏚
"B" mm2 Cu
Q
30 mA
Q5
IO
MS
FC (31)
Q1
Q2
Q3
Q4
Q6 (3A)
Q7
K1 (20)
K2 (33)
K3 (22)
K4 (23)
R7 (70W)
R8 (70W)
A3 (6) (16)
A4 (7) (29)
M1
M2
M3
M4
M5
M6
M7
C1
C2
C3
TK1 (16)
TK2 (16)
TK3 (16)
LOAD
FSC
F3
YLHA 50-60
YLHA 80
POSICIÓN MOTORES
POSITION OF MOTORS
LOS COMPONENTES INCLUIDOS EN ESTOS RECUADROS NO SON SUMINISTRADOS POR EL FABRICANTE
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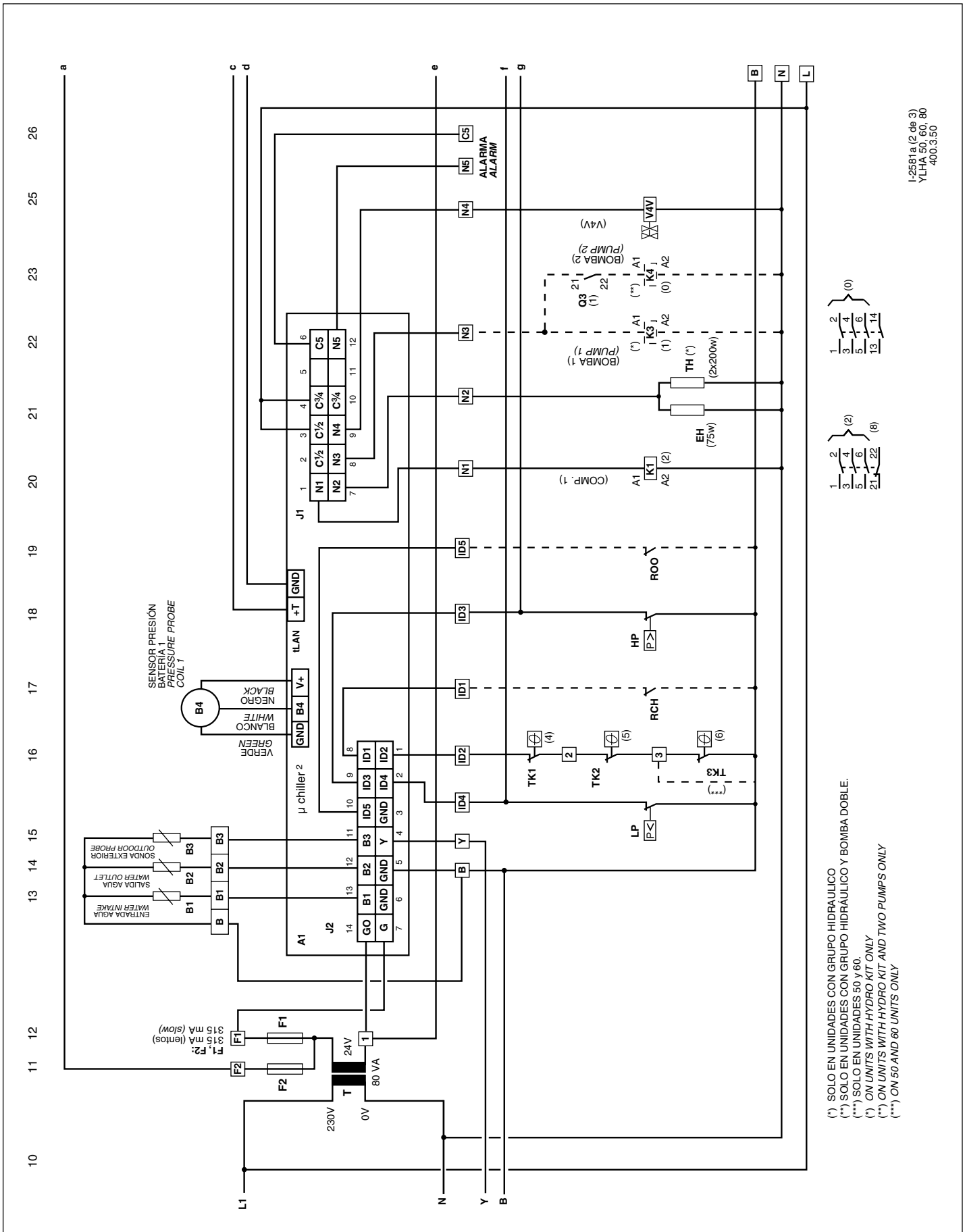
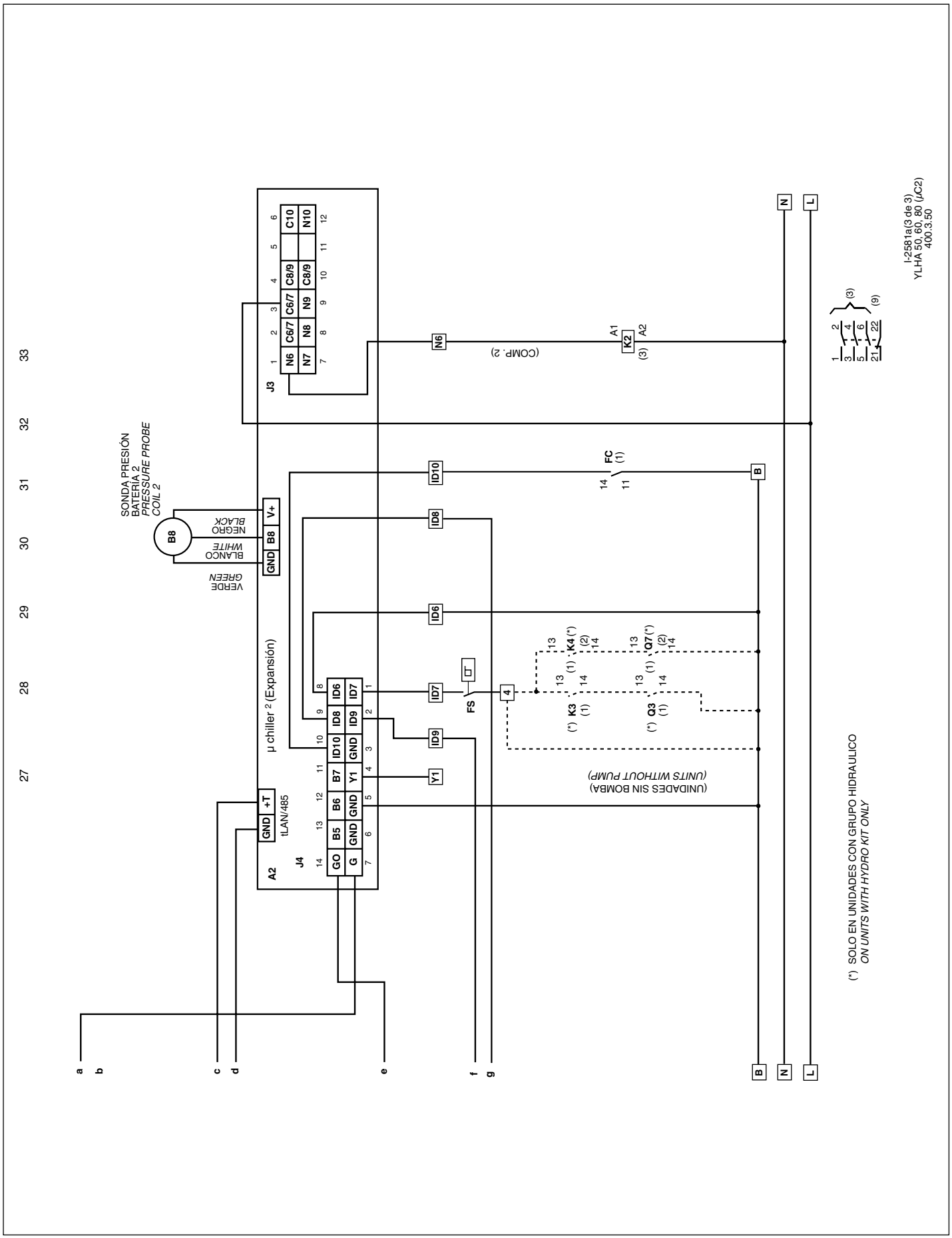
LOS COMPONENTES INCLUIDOS EN ESTOS RECUADROS SON ACCESORIOS STANDARD
THE COMPONENTS INCLUDED IN THESE BOXES ARE STANDARD ACCESSORIES.
A1: MODULO CONTROL BASE / BASE CONTROL MODULE
A2: MODULO EXPANSION / EXPANSION MODULE
B1: ENTRADA AGUA (TRANSDUCTOR) / WATER INTAKE (TRANSDUCER)
B2: SALIDA AGUA (TRANSDUCTOR) / WATER OUTLET (TRANSDUCER)
B3: TEMPERATURA EXTERIOR (SONDA NTC) / OUTDOOR TEMPERATURE (NTC PROBE)
B4: PRESIÓN REFRIG. CONTROL VELOCIDAD VENTIL MODULO A1 (SONDA NTC) / COOLING PRESSURE, FAN SPEED CONTROL A1 FAN MODULE (NTC PROBE)
B8: PRESIÓN REFRIG. CONTROL DE VELOCIDAD VENTIL. MODULO A2 (SONDA NTC) / COOLING PRESSURE, FAN SPEED CONTROL A2 FAN MODULE (NTC PROBE)
C1, C2, C3: CONDENSADORES MOTO-VENTILADORES / FAN MOTOR CONDENSERS
EH: RESISTENCIA EVAPORADOR / EVAPORATING UNIT HEATER
F1, F2: FUSIBLES PROTECCION A1 y A2 (315mA LENTOS) / A1 AND A2 PROTECTING FUSES (315mA SLOW)
F3: FUSIBLE VARIADOR VELOCIDAD / FAN SPEED CONTROLLER FUSE
FC: CONTROL DE FASES (SENTIDO DE GIRO DE LOS COMPRESORES) / PHASE CONTROL (COMPRESSOR ROTATIONAL DIRECTION)
FS: CONTROL DE CAUDAL / FLOW SWITCH
FSC: CONTROL VELOCIDAD VENTILADOR / FAN SPEED CONTROL
HP: PRESOSTATO ALTA (REARME AUTOMATICO) / HIGH PRESSURE SWITCH (AUTOMATIC RESET)
LP: PRESOSTATO BAJA (REARME AUTOMATICO) / LOW PRESSURE SWITCH (AUTOMATIC RESET)
K1, K2: CONTACTOR COMPRESOR 1-2 / COMPRESSOR CONTACTOR 1-2
K3: CONTACTOR BOMBA / PUMP CONTACTOR
M1, M2: COMPRESORES 1 Y 2 / COMPRESSORS 1 AND 2
M3, M4, M5: VENTILADORES / FANS
M6, M7: BOMBA 1 Y BOMBA 2 / PUMP 1 AND PUMP 2
MS: INTERRUPTOR GENERAL / MAIN SWITCH
Q: INTERRUPTORES AUTOMATICOS / AUTOMATIC SWITCHES
R7: RESISTENCIA CARTER COMP. 1 / SUMP HEATER, COMP. 1
R8: RESISTENCIA CARTER COMP. 2 / SUMP HEATER, COMP. 2
ROO: ON/OFF REMOTO / REMOTE ON/OFF
T: TRANSFORMADOR 230/24V / 230/24V TRANSFORMER
TH: RESISTENCIA DEPOSITO / TANK HEATER
TK1, TK2, TK3: PROTECTORES TERMICOS MOTORES M1, M2 Y M5 / HEAT PROTECTORS M1, M2 AND M5 FANS M3, M4
V4V: VALVULAS CUATRO VIAS (SOLO EN YLHA) / FOUR-WAY VALVE
I-2581a (1 de 3)
YLHA 50, 60, 80
400.3.50

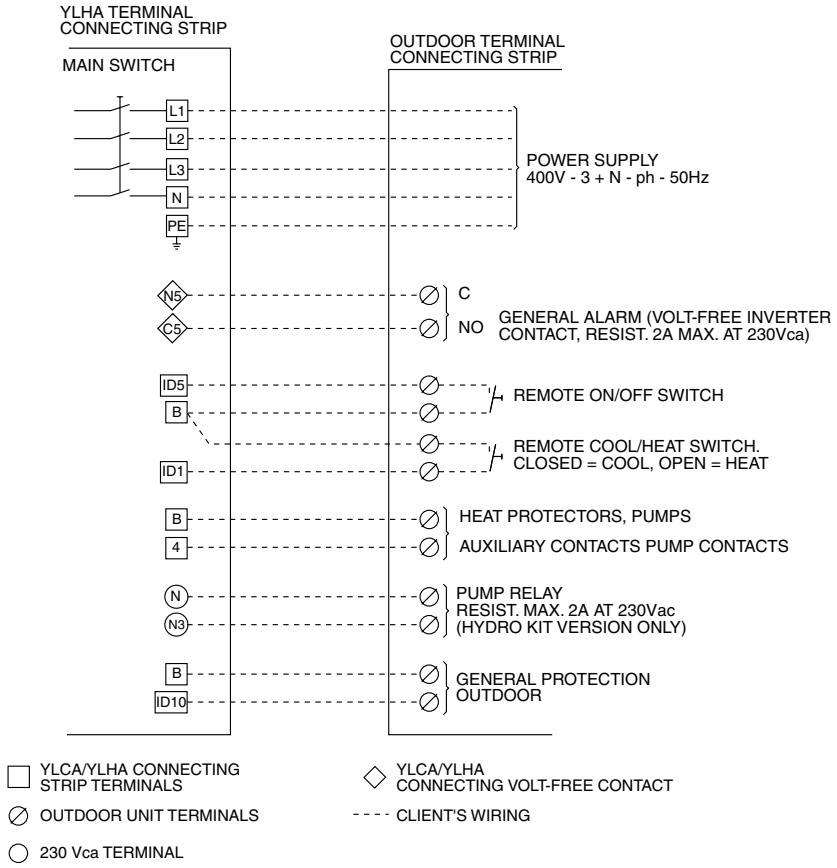
Wiring diagram, YLHA 50, 60 and 80 (µC2), 400.3.50 (2/3)



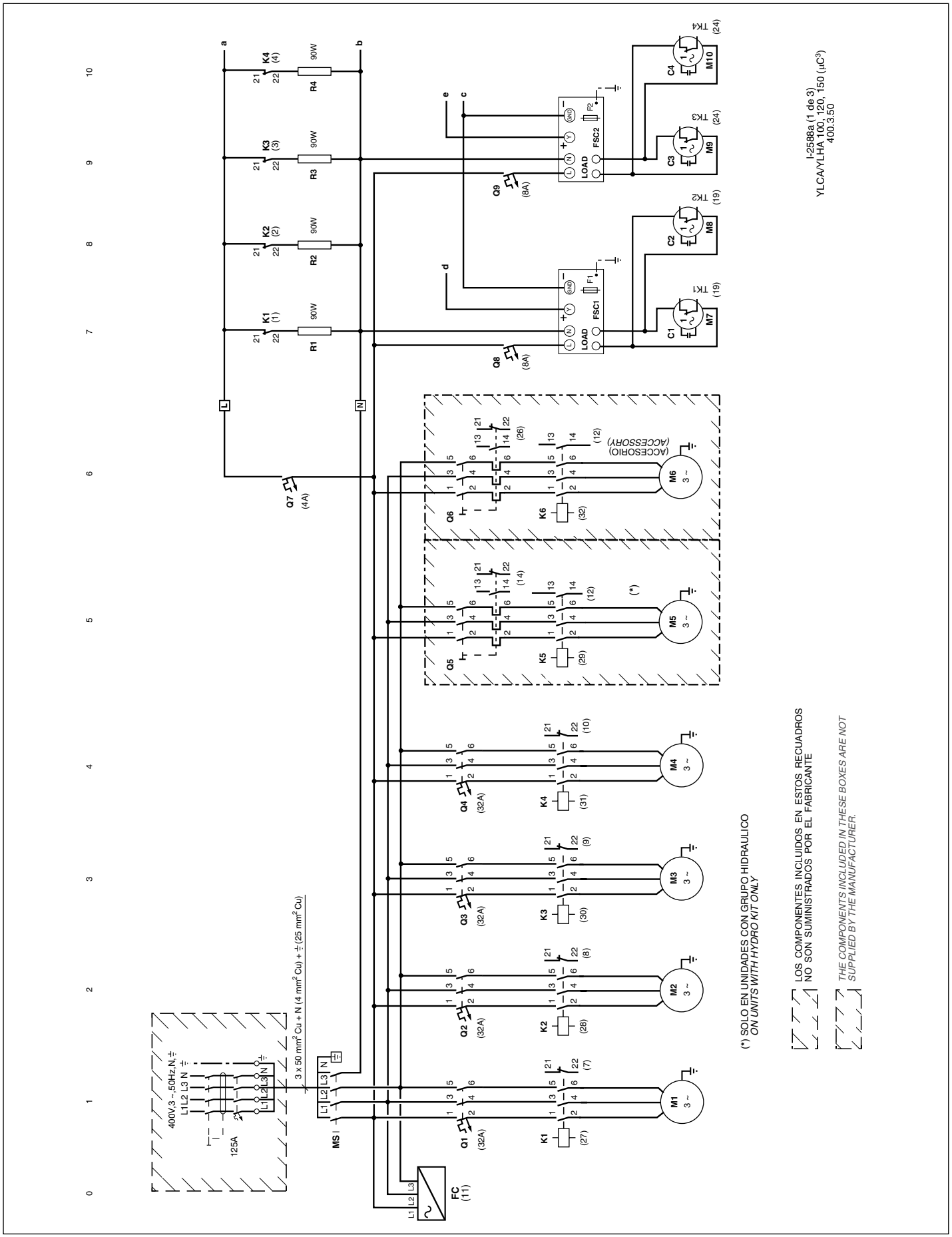
Wiring diagram, YLHA 50, 60 and 80 (µC2), 400.3.50 (3/3)



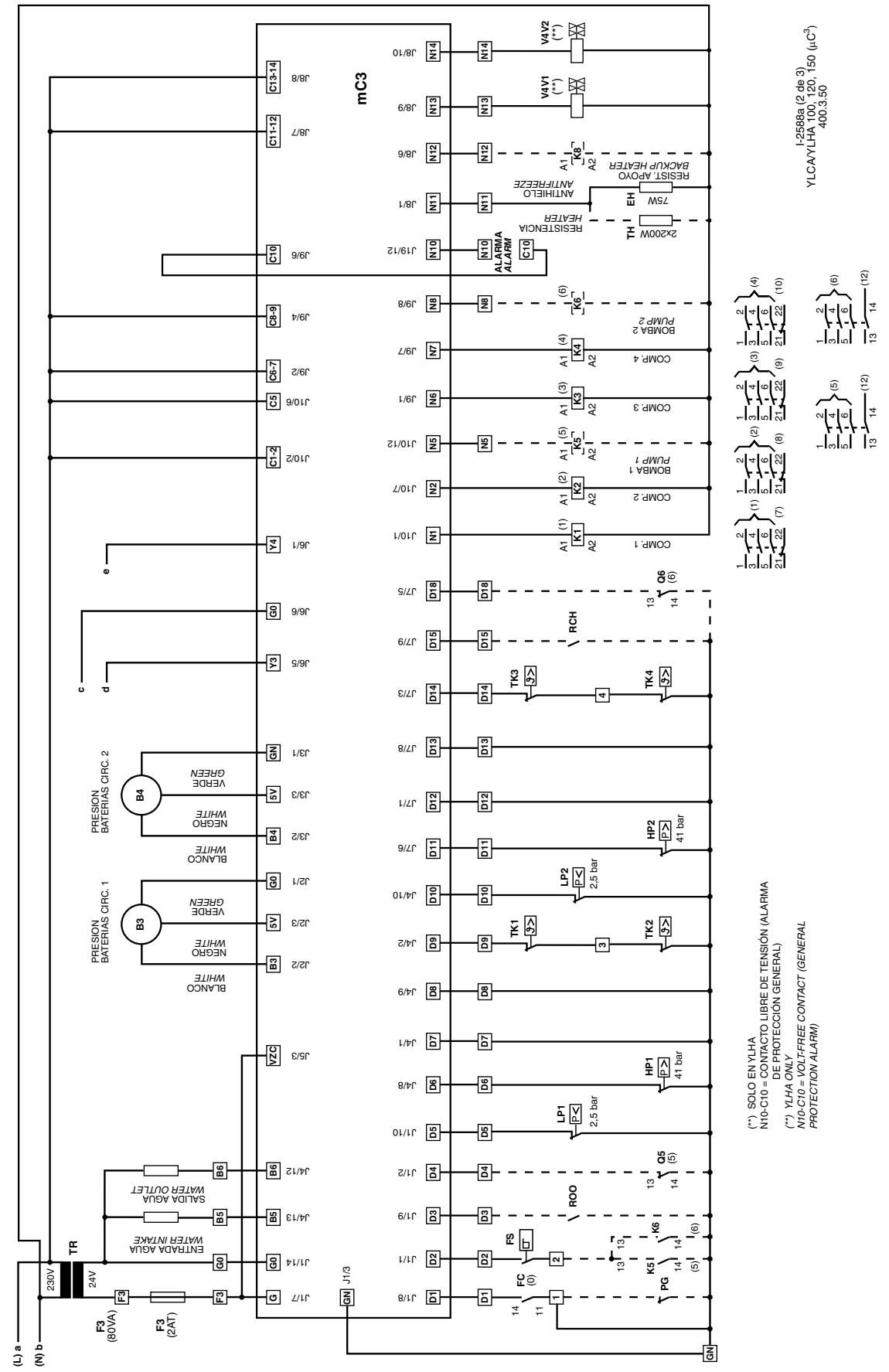
Wiring, YLCA 50, 60 and 80



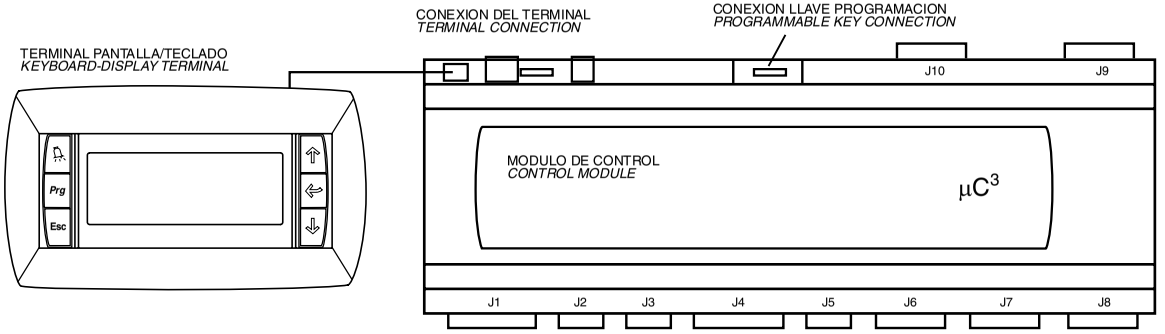
Wiring diagram, YLCA/YLHA 100, 120 and 150 (μC³), 400.3.50 (1/3)


I-2588a (1 de 3)
YLCA/YLHA 100, 120, 150 (μC³)
400.3.50
400V,3~,50Hz,N,⏚
L1 L2 L3 N ⏚
125A
3 x 50 mm² Cu + N (4 mm² Cu) + ⏚ (25 mm² Cu)
MS
FC (11)
K1 (27) K2 (28) K3 (30) K4 (31) K5 (29) K6 (32)
Q1 (32A) Q2 (32A) Q3 (32A) Q4 (32A) Q5 Q6 Q7 (4A) Q8 (8A) Q9 (8A)
M1 M2 M3 M4 M5 M6 (ACCESSORIO) (ACCESSORY) M7 M8 M9 M10
C1 C2 C3 C4
TK1 (19) TK2 (19) TK3 (24) TK4 (24)
FSC1 FSC2 LOAD
R1 90W R2 90W R3 90W R4 90W
K1 (1) K2 (2) K3 (3) K4 (4)
(*) SOLO EN UNIDADES CON GRUPO HIDRAULICO
ON UNITS WITH HYDRO KIT ONLY
LOS COMPONENTES INCLUIDOS EN ESTOS RECUADROS NO SON SUMINISTRADOS POR EL FABRICANTE
THE COMPONENTS INCLUDED IN THESE BOXES ARE NOT SUPPLIED BY THE MANUFACTURER.

Wiring diagram, YLCA/YLHA 100, 120 and 150 (μC³), 400.3.50 (2/3)



B3, 4:	SENSORES DE PRESION BATERIAS CIRCUITOS 1 y 2 *PRESSURE SENSORS, COILS CIRCUITS 1 AND 2*
B5:	SONDA TEMPERATURA ENTRADA AGUA (NTC) *WATER INTAKE TEMPERATURE PROBE (NTC)*
B6:	SONDA TEMPERATURA SALIDA AGUA (NTC) *WATER OUTLET TEMPERATURE PROBE (NTC)*
C1, 2, 3, 4:	CONDENSADORES DE LOS VENTILADORES/*FAN CONDENSERS*
EH:	RESISTENCIA ANTIHIELO EVAPORADOR *EVAPORATING UNIT ANTIFREEZE HEATER*
F1, 2:	FUSIBLES DE LOS VARIADORES DE VELOCIDAD DE LOS VENTILADORES *FUSES OF THE FAN SPEED CONTROLLERS*
F3:	FUSIBLE DE PROTECCION DEL REGULADOR μC³ (2AT) *CONTROLLER FUSE μC³ (2AT)*
FC:	CONTROL DE FASES (SENTIDO DE GIRO DE LOS COMPRESORES) *PHASE CONTROL (COMPRESSOR ROTATIONAL DIRECTION)*
FS:	CONTROL DE CAUDAL DE AGUA/*WATER FLOW SWITCH*
FSC1, 2:	REGULADORES DE VELOCIDAD DE LOS VENTILADORES DE LOS CIRCUITOS 1 y 2 *FAN SPEED CONTROL OF CIRCUITS 1 AND 2*
HP1, 2:	PRESOSTATOS DE ALTA CIRCUITO 1 y 2 *HIGH PRESSURE SWITCH CIRCUITS 1 AND 2*
K1, 2, 3, 4:	CONTACTORES DE LOS COMPRESORES/*COMPRESSOR CONTACTORS*
K5, 6:	CONTACTORES DE LAS BOMBAS/*PUMP CONTACTORS*
K8:	CONTACTOR RESISTENCIA DE APOYO/*BACKUP HEATER CONTACTOR*
LP1, 2:	PRESOSTATOS DE BAJA CIRCUITO 1 y 2/*LOW PRESSURE SWITCH CIRCUITS 1 AND 2*
M1, 2, 3, 4:	MOTORES DE LOS COMPRESORES/*COMPRESSOR MOTORS*
M5, 6:	MOTORES DE LAS BOMBAS (ACCESORIO)/*PUMP MOTORS (ACCESSORY)*
M7, 8, 9, 10 :	MOTORES DE LOS VENTILADORES/*FAN MOTORS*
MS:	INTERRUPTOR GENERAL/*MAIN SWITCH*
μC3:	REGULADOR MICROCHILLER 3/*MICROCHILLER 3 CONTROLLER*
PDW:	PRESOSTATO DIFERENCIAL CIRCUITO AGUA *WATER CIRCUIT DIFFERENTIAL PRESSURE SWITCH*
Q:	INTERRUPTOR PRINCIPAL/*MAIN SWITCH*
Q1, 2, 3, 4:	INTERRUPTORES AUTOMATICOS DE LOS COMPRESORES *AUTOMATIC COMPRESSOR SWITCHES*
Q5, 6:	INTERRUPTORES AUTOMATICOS DE LAS BOMBAS M5 y M6 *M5 AND M6 PUMP AUTOMATIC SWITCHES*
Q7:	INTERRUPTOR AUTOMATICO DEL CIRCUITO DE MANIOBRA *OPERATING CIRCUIT AUTOMATIC SWITCH*
Q8, 9:	INTERRUPTORES AUTOMATICOS DE LOS VENTILADORES DE LOS CIRCUITOS 1 y 2 CIRCUIT 1 AND 2 FAN AUTOMATIC SWITCHES
R1, 2, 3, 4:	RESISTENCIAS DE CARTER DE LOS COMPRESORES COMPRESSOR SUMP HEATERS
RCH:	FRIO/CALOR REMOTO/*REMOTE COOL/HEAT*
ROO:	ON/OFF REMOTO/*REMOTE ON/OFF*
TH:	RESISTENCIA ANTIHIELO DEPOSITO/*TANK ANTIFREEZE HEATER*
TK1, 2, 3, 4:	PROTECTORES TERMICOS DE LOS VENTILADORES *FAN HEAT PROTECTORS*
TR:	TRANSFORMADOR 230/24, 80VA/*230/24, 80VA TRANSFORMER*
V4V1 ,2:	VALVULAS DE CUATRO VIAS CIRCUITOS 1 y 2 *FOUR-WAY VALVES CIRCUITS 1 AND 2*



J1						
G0	B1	B2	B8	D5	D3	D1
14	13	12	11	10	9	8
7	6	5	4	3	2	1
G	G0	G0	Y1	G0	D4	D2

J2		
GN	B3	5VR
1	2	3

J3		
GN	B4	5VR
1	2	3

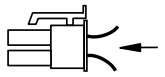
J4						
X	B5	B6	B7	D10	D8	D6
14	13	12	11	10	9	8
7	6	5	4	3	2	1
X	GN	GN	Y2	GN	D9	D7

J5		
B9	GN	B10
6	5	4
3	2	1
VZC	GN	VDC

J6			
Y5A	Y5	GN	Y3
8	7	6	5
4	3	2	1
Y6A	Y6	GN	Y4

J7				
D17	D15	D13	GN	D11
10	9	8	7	6
5	4	3	2	1
D18	D16	D14	GN	D12

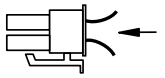
J8				
N14	N13	C13-14	C11-12	N12
10	9	8	7	8
5	4	3	2	1
X	X	C13-14	C11-12	N11



J1, J4, J5
J6, J7, J8

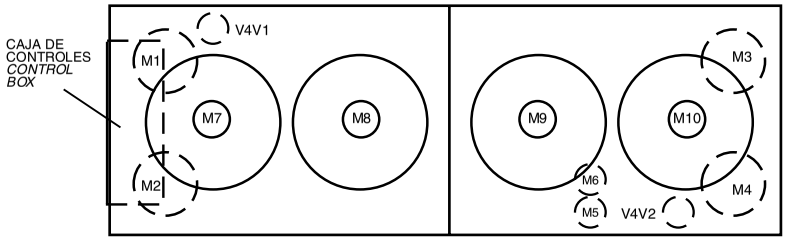
J9					
N6	C6-7	C6-7	C8-9	X	C10
1	2	3	4	5	6
7	8	9	10	11	12
N7	N8	N9	C8-9	X	N10

J10					
N1	C1-2	C1-2	C3-4	X	C5
1	2	3	4	5	6
7	8	9	10	11	12
N2	N3	N4	C3-4	X	N5



J9, J10

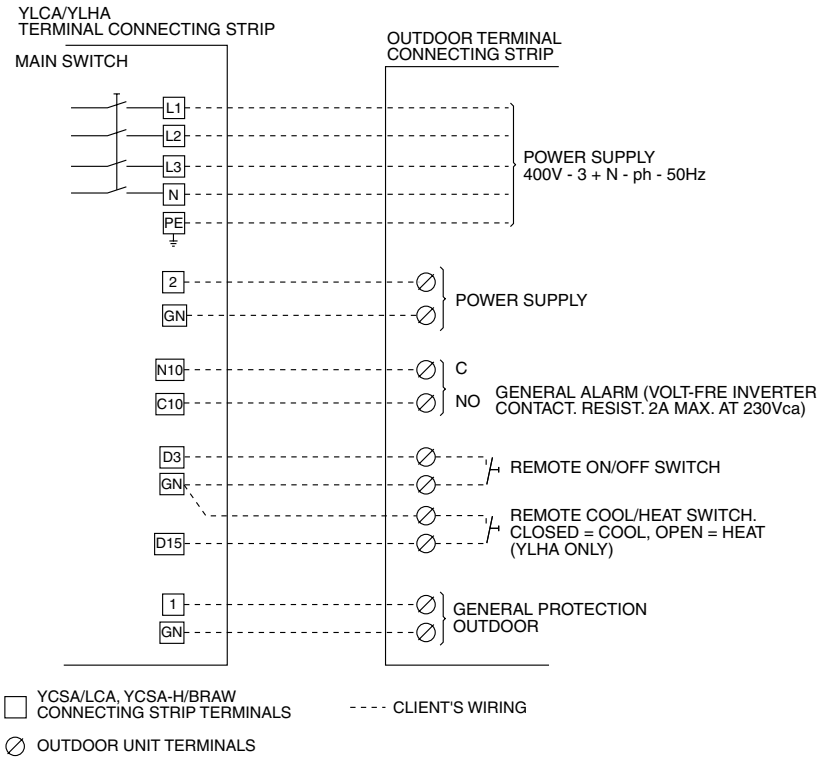
IDENTIFICACION DE LOS CONECTORES Y DE SUS TERMINALES
IDENTIFICATION OF THE CONNECTORS AND THEIR TERMINALS



DISTRIBUCION DE LOS MOTORES Y VALVULAS
DISTRIBUTION OF MOTORS AND VALVES

I-2588a (3 de 3)
YLCA/YLHA 100, 120, 150 (μC³)
400.3.50

Wiring, YLCA/YLHA 100, 120 and 150



Electrical characteristics

Model	Power supply V.ph.Hz.	Compressor					Fans		Pump	
		Nominal A		Start	Nominal kW		Nominal	Nominal	Nominal	Nominal
		Cool	Heat	A	Cool	Heat	A	W	A	W
YLCA 40	400.3.50	21.7	-	174	12.46	-	2 x 1.9	2 x 400	1.9	1 035
YLHA 40		25.8	24.5		12.49	11.7				
YLCA 50		2 x 15.5	-	118	2 x 8.50	-	2 x 2.8	2 x 600	1.8	990
YLHA 50		2 x 15	2 x 15.3		2 x 8	2 x 8.3				
YLCA 60		2 x 16.7	-		2 x 9.20	-	2 x 2.8	2 x 600	2.9	1 515
YLHA 60		2 x 16.7	2 x 16.7		2 x 9.20	2 x 9.2				
YLCA 80		2 x 24.6	-	174	2 x 12.4	-	3 x 2.8	3 x 600	3.3	1 620
YLHA 80		2 x 24.9	2 x 24.6		2 x 12.1	2 x 12.2			3.2	1 580
YLCA 100		4 x 16	-	118	4 x 7.8	-	4 x 2.8	4 x 600	4.4	2 395
YLHA 100		4 x 16	4 x 15.5		4 x 8.3	4 x 8.4				
YLCA 120		4 x 17.7	-		4 x 9.4	-			5.5	3 180
YLHA 120		4 x 18.2	4 x 16.9		4 x 10.2	4 x 9.2				
YLCA 150		4 x 23.5	-	174	4 x 12.53	-	4 x 3.9	4 x 860	6.1	3 400
YLHA 150		4 x 23.5	4 x 24.5		4 x 11.8	4 x 12.5				

Limits of use

Model	Voltage limits		Entering air temperature to coil DB				Water output temperature				Temperature dif. between water output and intake	
	Nominal at 400		Operating cycle				Operating cycle					
			Minimum °C		Maximum °C		Minimum °C		Maximum °C		Minimum °C	Maximum °C
	Minimum	Maximum	Cool	Heat	Cool	Heat	Cool	Heat	Cool	Heat		
YLCA	342	436	-10(3)	-	46(2)	-	6(1)	-	15	-	3	7
YLHA				-15		20		30		50(4)		

(1) At lower water temperatures, it is advisable to use glycol type antifreeze mixtures. Minimum T° with glycol -5° C. (2) IPESL - SdM - UMT - TÜV, 38° C SAQ, 40° C DUTCH. (3) -18° C with low temperature kit (optional) on YCSA/LCA models. (4) 50° C if intake air is -0° C.

Prior to final approval of the installation

Check:
- Voltage is always between 342 - 436 V.
- Power supply cable section is, at least, as indicated on the corresponding wiring diagrams.

- Maintenance instructions have been given, or a regular maintenance contract has been signed.
- Operating instructions have been given to the user.

- The warrantee card has been filled out.

Operating Instructions µC2
YLCA/YLHA 40

Description of control unit

This is a multipurpose controller specially programmed for use with air-water chillers and heat pumps equipped with a compressor with one single power stage.

Main functions

- Water temperature control (at intake or outlet, as per parameter r6).
- Defrost cycle management.
- System operating and safety management.
- Fan speed control.
- Alarm management.
- Connection for supervision and telephone assistance (accessory serial connection RS485).

Devices controlled

- Compressor
- Fans
- Four-way valve
- Water pump
- Alarm device
- Auxiliary heater

Standard components

- ***Control module.*** - This is the central nucleus that processes the signals coming from the probes and protection elements of the entire system to control its active elements: compressor and fans, four-way valve, water circulating pump, alarm relay and auxiliary heater. Power supply 24 Vac.

  Can also be used for access and control of the system by means of the display, buttons and LEDs available. Allows selection cool, heat and off functions. Operating parameters can also be modified, and the system can be supervised as well.

- ***Fan speed control module***. Operates by phase cut-off. Includes fuse.

- ***NTC and ratiometric (pressure) probes.***
  YLCA/YLHA
  3 NTC probes are used to read system temperatures and a ratiometric pressure transducer (B4) to read refrigerant pressure inside the coil:
  B1. Controls set point. Reads water temperature at exchanger intake.
  B2. Antifreeze control. Reads water temperature at exchanger discharge.
  B3. Controls dynamic set point. Reads outdoor air temperature.
  B4. Fan speed and defrost cycle control. Reads refrigerant pressure inside the coil.

Parameters

The set of parameters that configure the operating program of the unit is divided into four levels (*Factory, Super User, User and Direct*), depending upon the function of each parameter and the user's access level. The parameters of each level can be modified from that same level, as well as lower level parameters.

***Factory* level**

Accessible with the *Factory password*. Allows configuration of all unit parameters.

***Super User* level**

Accessible with *Super User password*. Allows setting *Super User, User and Direct* parameters.

***User* level**

Accessible with *password 22*. Allows access to all parameters the user normally sets.

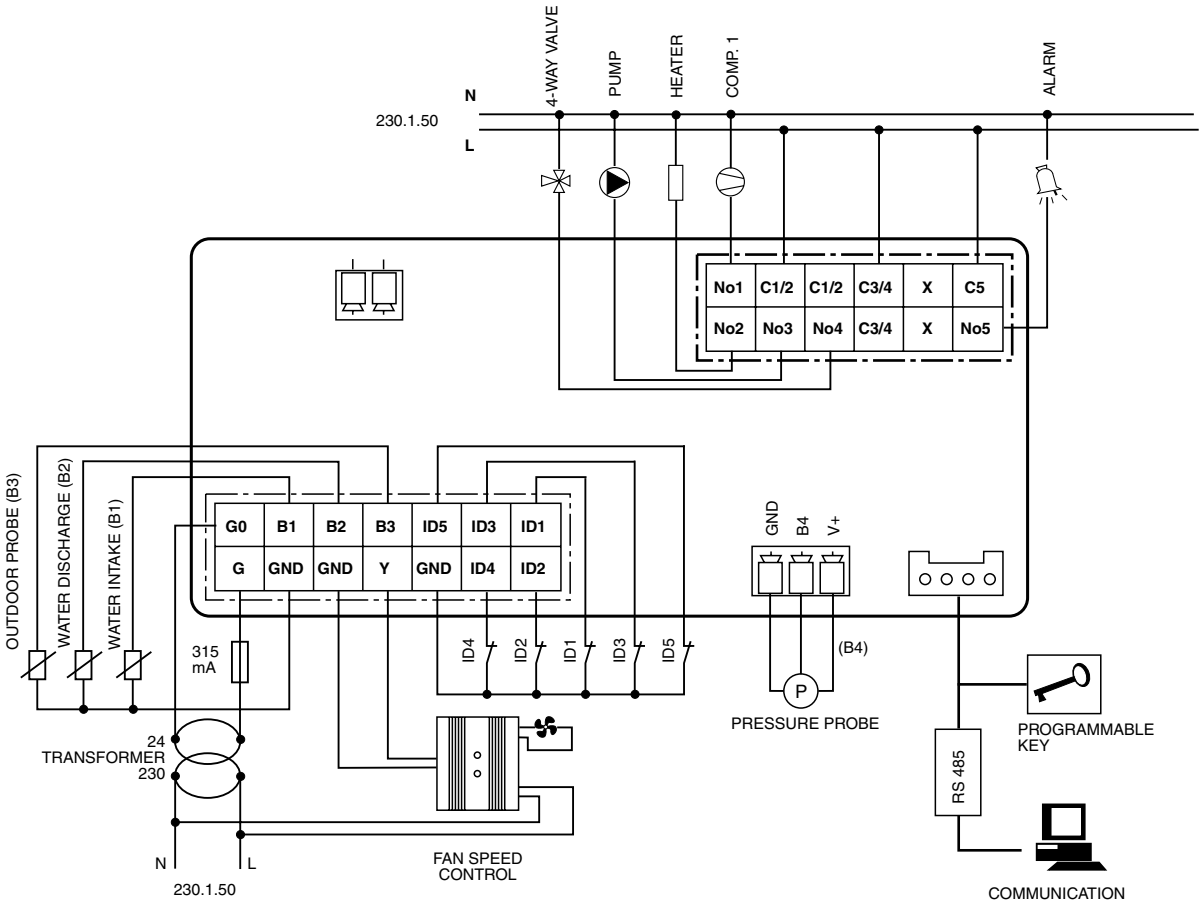
***Direct* level**

Accessible without a *password*. Allows reading the values detected by the probes, as well as other system values. Can be used by the user without affecting unit operation.

General

Modification of the parameters that affect basic unit configuration should be made with the controller in *Standby* position.

General diagram, YLCA/YLHA 40

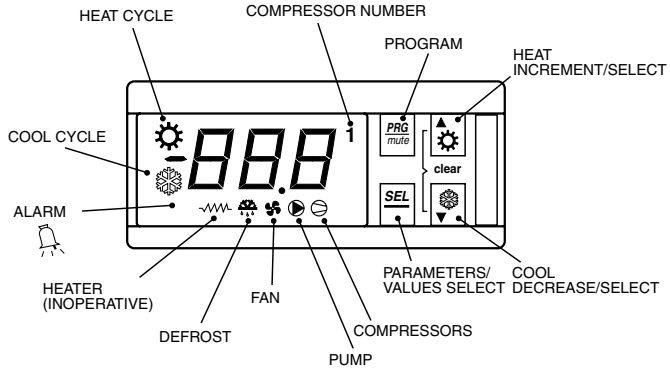


B1: WATER INTAKE TEMPERATURE PROBE (SET POINT CONTROL)
B2: WATER DISCHARGE TEMPERATURE PROBE (ANTIFREEZE PROTECTION)
B3: COIL TEMPERATURE PROBE (FAN SPEED AND DEFROST CONTROL)
B4: OUTDOOR TEMPERATURE PROBE (DYNAMIC SET POINT)
ID1: WATER FLOW SWITCH
ID2: REMOTE COOL/HEAT
ID3: HIGH PRESSURE SWITCH
ID4: LOW PRESSURE SWITCH
ID5: REMOTE ON/OFF

Symbols on the display

The display has three figures in green, plus a symbol and a decimal. It also shows the symbols, in amber, of the functions selected (the alarm symbol is red).

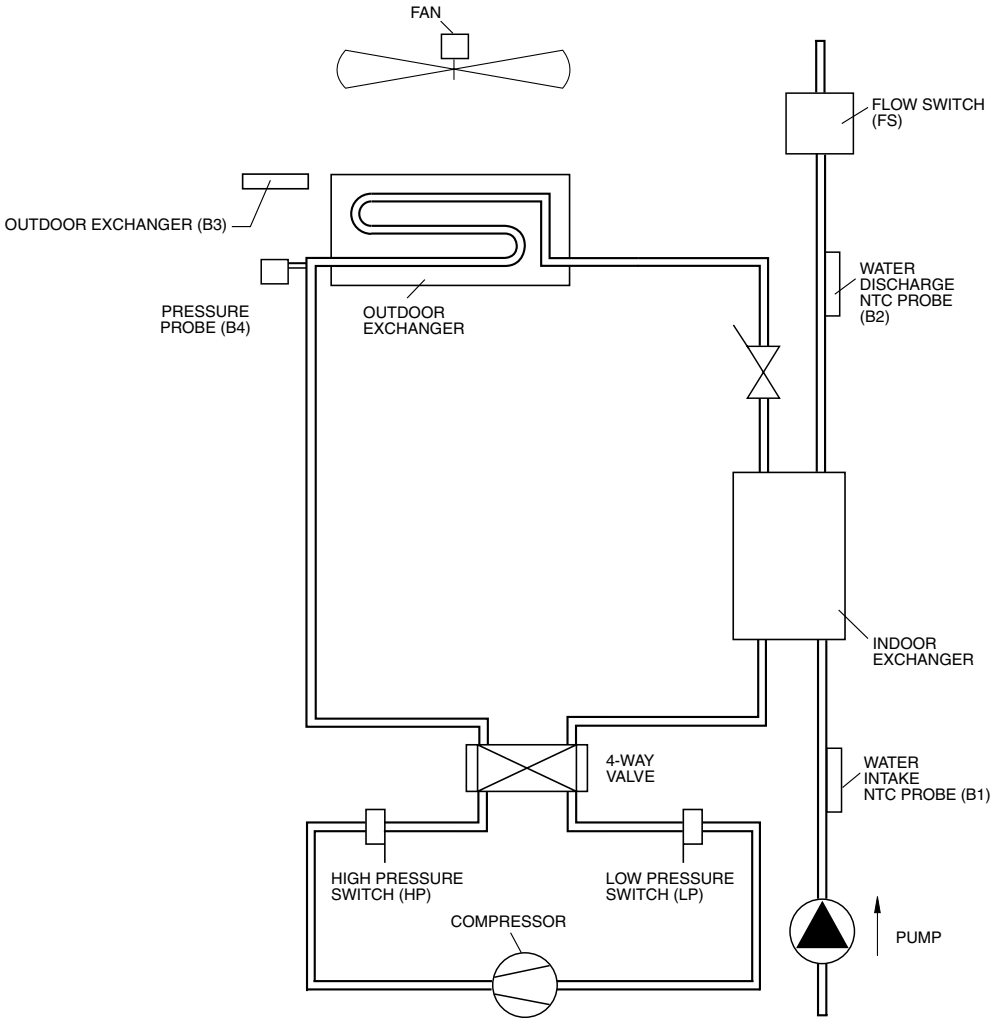
Symbol	Colour	Meaning	
		Red LED on constantly	**Red LED flashing**
1	Amber	Compressor in operation	Timing start-up
		Compressor on call	-
		Water pump in operation	-
		Fans in operation	-
		Defrost activated	-
	Red	Alarm activated	-
	Amber	Cool cycle	-
		Heat cycle	-



Functions of remote control unit buttons

BUTTON	UNIT STATUS	PRESSING
Prg/mute	Loads values by default	Applies voltage when pressed
	Return to superior sub-group within programming area until output of same (except changes in E2PROM)	Simply press
Sel	Access to *Direct* parameters	Press 5 seconds
	Selects a *Direct* parameter and shows its value / Confirms parameter changes	Simply press
Prg+Sel	Programming parameters with *password*	Press 5 seconds
▲ ☼	Selects superior parameter within the programming area	Simply press or continuous
	Increase value	Simply press or continuous
	Selects heat function from *standby* position and vice-versa (P6=1	Press 5 seconds
▼ ❄	Selects lower parameter within programming area	Simply press or continuous
	Lower value	Simply press or continuous
	Selects cool function from standby position and vice-versa (P6=1)	Press 5 seconds
▲ ☼ + ▼ ❄	Manual alarm reset	Press 5 seconds
	Clears hour counters (within programming area)	Press 5 seconds
Sel + ☼	Forced manual defrost	Press 5 seconds

Location of controls



Parameter tables

The following tables show the parameters and their values divided into groups.

Parameter level codes

D = *Direct*
U = *User*
S = *Super User*
F = *Factory*

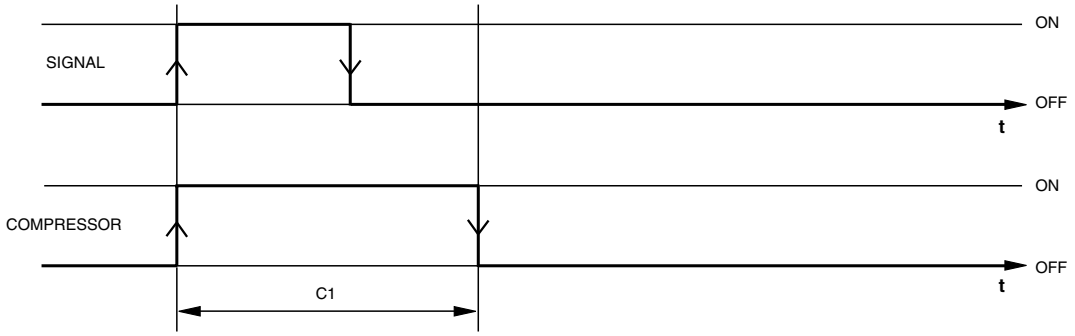
Variables for supervision (VS)

R/W = Read/write parameter
R = Read only parameter

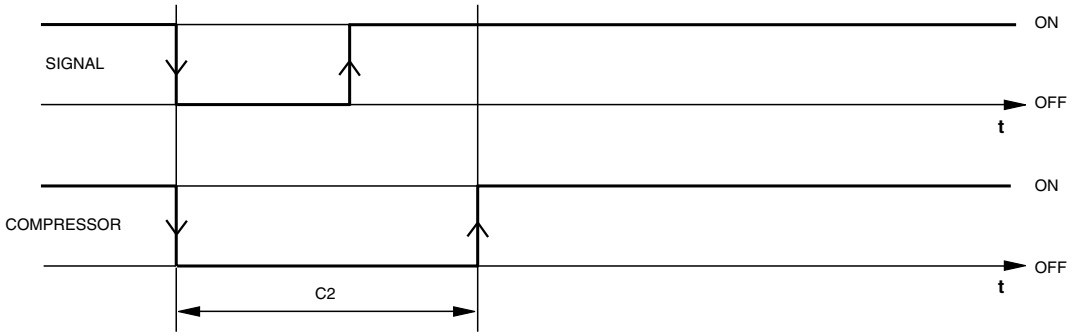
Parameters related to the probes							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
/01	NTC B1 probe (water intake); 0=absent (function not available). 1=present	F	1 (R/W)	-	1	0	**1**
/02	NTC B2 probe (water outlet). 0=absent (function not available). 1=present	F	2 (R/W)	-	1	0	**1**
/03	NTC B3 probe . 1=condensation probe. 2=outdoor probe.	F	14 (R/W)	-	1	0	**2**
/04	Probe type B4, 0=absent, 1=ON/OFF, 2=outdoor NTC probe, 3=ratiometric 5Vdc.	F	15 (R/W)	-	3	0	**3**
/09	Minimum input voltage	F	18 (R/W)	0.01 Vdc	/10	0	**50**
/10	Maximum input voltage	F	19 (R/W)	0.01 Vdc	500	/09	**450**
/11	Minimum pressure	F	1 (R/W)	bar	/12	0	**0**
/12	Maximum pressure	F	2 (R/W)	bar	99.9	/11	**45**
/13	Calibration probe B1	F	3 (R/W)	°C	12	-12	**0**
/14	Calibration probe B2	F	4 (R/W)	°C	12	-12	**0**
/15	Calibration probe B3	F	5 (R/W)	°C	12	-12	**0**
/16	Calibration probe B4	F	6 (R/W)	bar	12	-12	**0**
/21	Digital filter	U	20 (R/W)	-	15	1	**4**
/22	Input limitation	U	21 (R/W)	-	15	1	**8**
/23	Measuring unit 0 = C; 1 = 1F	U	5 (R/W)	-	1	0	**0**
b00	Probe viewed on display	U	24 (R/W)	-	7	0	**0**
b01	Value read by probe B1	D	70 (R)	°C	-	-	**-**
b02	Value read by probe B2	D	71 (R)	°C	-	-	**-**
b03	Value read by probe B3	D	72 (R)	°C	-	-	**-**
b04	Value read by probe B4	D	73 (R)	°C/bar	-	-	**-**

Parameters related to the probes							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
c01	Minimum operating time	U	25 (R/W)	Sec.	999	0	**120**
c02	Minimum OFF time	U	26 (R/W)	Sec.	999	0	**60**
c03	Time between start-ups of the same compressor	U	27 (R/W)	Sec.	999	0	**300**
c06	Start-up timing	U	30 (R/W)	Sec.	999	0	**10**
c07	Compressor start-up delay with regard to the pump	U	31 (R/W)	Sec.	150	0	**20**
c08	Pump OFF delay with regard to the compressor	U	32 (R/W)	Min.	150	0	**1**
c10	Operating hour counter for compressor	D	90 (R)	Hours	800	0	-
c14	Operating hour counter for compressor maintenance	U	34 (R/W)	Hours	100	0	**0**
c15	Operating hour counter for pump	D	94 (R/W)	Hours	800	0	-
c17	Minimum time between pump start-ups	U	35 (R/W)	Min.	150	0	**5**
c18	Minimum operating time for pump	U	36 (R/W)	Min.	15	0	**1**

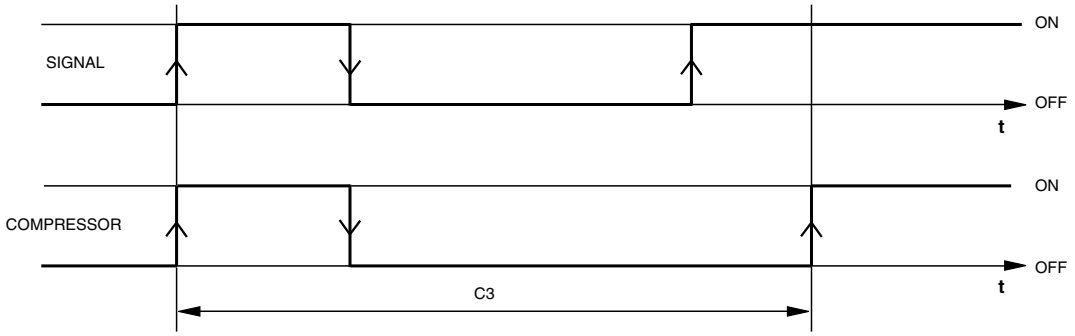
Minimum operating time of a compressor



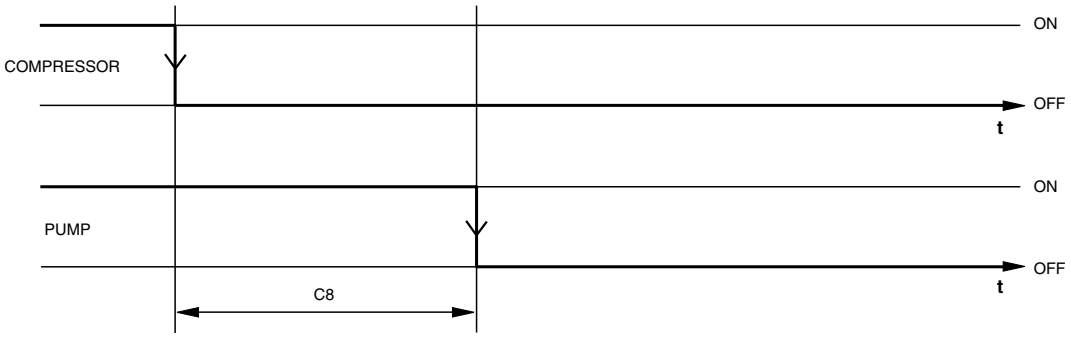
Minimum OFF time of a compressor



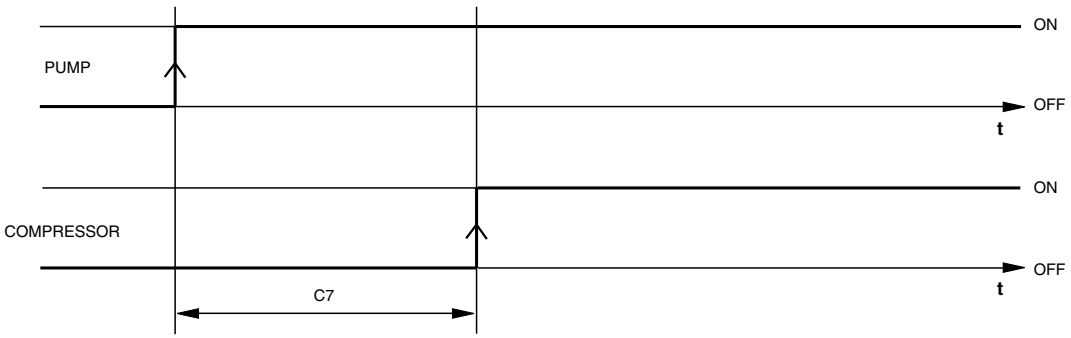
Minimum time between compressor start-ups



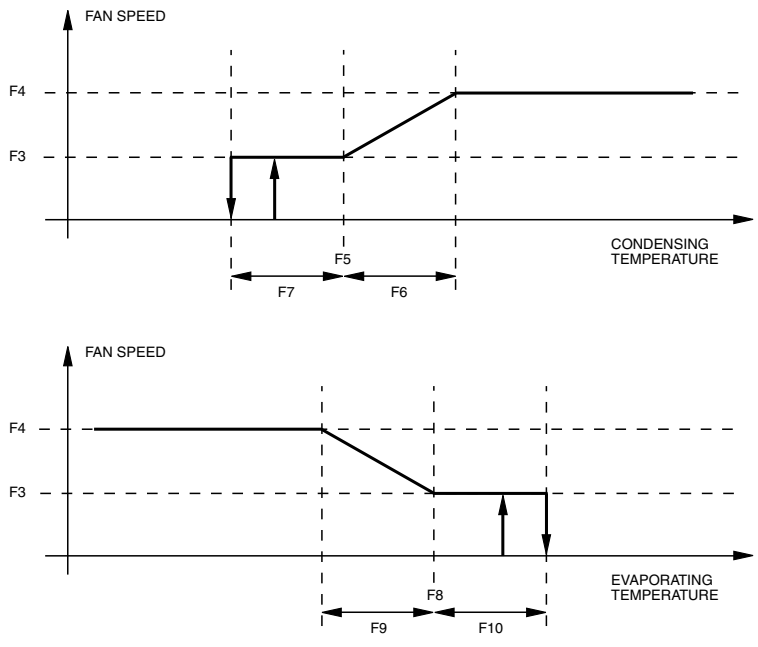
Compressor/pump OFF delays



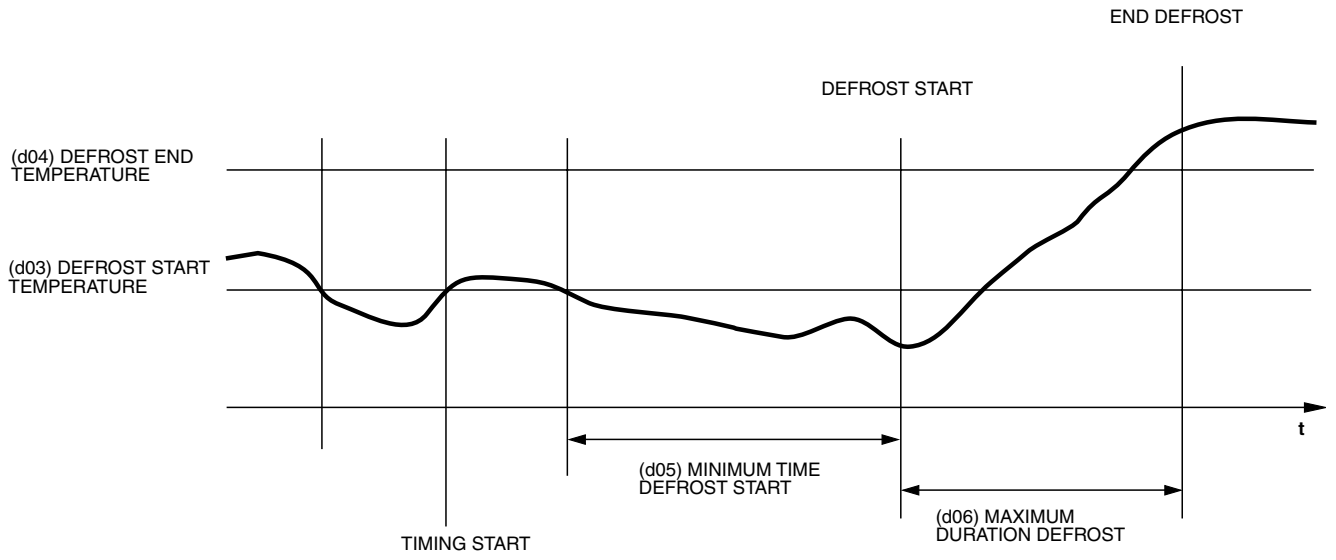
Pump/compressor start-up delays



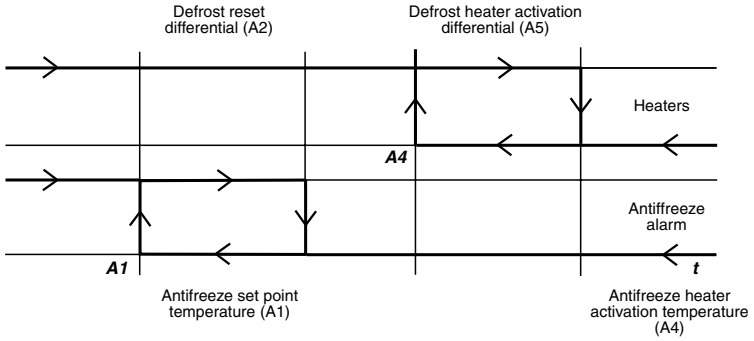
Parameters related to the fans							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
F01	Fan outlet. 0=absent (function not available); 1=present	F	10 (R/W)		1	0	**1**
F02	Operating mode: 0= always ON (function not available) 1= Parallel with compressor (function not available) 2= ON/OFF operation (function not available) 3= Parallel with compressor and speed adjustment.	U	48 (R/W)		3	0	**3**
F03	Minimum triac voltage	F	49 (R/W)	step	F04	0	**50**
F04	Maximum triac voltage	F	50 (R/W)	step	100	F03	**85**
F05	Cool cycle minimum speed pressure	F	24 (R/W)	bar	80	-40	**22.2**
F06	Cool cycle maximum speed pressure differential	F	26 (R/W)	bar	50	0	**3.7**
F07	Cool cycle fan OFF pressure differential	F	28 (R/W)	bar	50	0	**6.5**
F08	Heat cycle minimum speed pressure	F	30 (R/W)	bar	80	-40	**8.7**
F09	Heat cycle maximum speed pressure differential	F	32 (R/W)	bar	50	0	**0.9**
F10	Heat cycle fan OFF pressure differential	F	34 (R/W)	bar	F08	0	**1.9**
F11	Fan start-up time	F	51 (R/W)	Sec.	120	0	**10**
F12	Triac impulse duration	F	52 (R/W)	Sec.	10	0	**2**
F13	Fan management in defrost mode. 0= fan deactivated 1= fan activated in cool cycle mode (function not available) 2= fan deactivated until defrost end temperature is reached and start-up at maximum speed for d16	F	53 (R/W)		2	0	**2**
F14	Fan in operation when starting with high ambient temperature	U	91 (R/W)	Sec.	999	0	**30**



Parameters related to defrost							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
d01	Execution of defrost 0= no (function not available) 1= yes.	U	7 (R/W)	-	1	0	**1**
d02	Time or temperature defrost. 0= time (function not available). 1= temperature	U	8 (R/W)	-	1	0	**1**
d03	Defrost start pressure	U	19 (R/W)	bar	d04	/11	**5.8**
d04	Defrost end pressure	U	21 (R/W)	bar	/12	d03	**18**
d05	Minimum time for defrost start	U	37 (R/W)	Sec.	150	10	**10**
d06	Minimum defrost duration	U	38 (R/W)	Sec.	150	0	**0**
d07	Maximum defrost duration	U	39 (R/W)	Min.	15	1	**6**
d08	Time between two defrost cycles	U	40 (R/W)	Min.	150	10	**30**
d11	Activation of heaters in defrost 0= no. 1= yes.	U	9 (R/W)	-	0	1	**1**
d12	Compressor OFF before defrost	F	43 (R/W)	Min.	3	0	**1**
d13	Compressor OFF after defrost	F	44 (R/W)	Min.	3	0	**1**
d16	Time of forced vent after defrost (only if F13=2).	F	47 (R/W)	Sec.	360	0	**60**



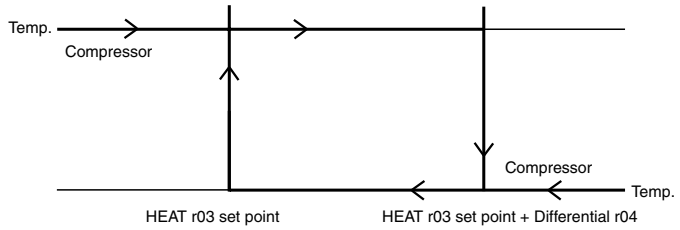
Parameters related to defrost control configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
A01	Antifreeze control set point temperature	U	11 (R/W)	°C	-	A07	**3**
A02	Antifreeze reset differential	U	12 (R/W)	°K	50	0.3	**5**
A03	Antifreeze alarm bypass time	U	22 (R/W)	Sec.	150	0	**0**
A04	Antifreeze heater activation temperature	U	13 (R/W)	°C	r16	A01	**3**
A05	Antifreeze heater activation differential	U	14 (R/W)	°K	50	0.3	**2**
A06	Backup heater control probe 0= control probe 1= antifreeze probe	F	6 (R/W)	-	1	0	**0**
A07	Minimum level antifreeze control set point temperature	U	15 (R/W)	°C	79	-40	**3**
A08	Heating heater activation set point temperature	U	16 (R/W)	°C	r15	A01	**3**
A09	Heating heater deactivation set point temperature differential	U	17 (R/W)	°C	50	0.3	**3**
A10	Automatic start-up by antifreeze alarm (unit in standby) 0= function deactivated 1= Water pump + heater 2= Water pump + heater + compressor (heat pumps only) 3= Heater	U	23 (R/W)		3	0	**1**



Parameters for unit configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
H01	Unit model. 2= air-water chiller (LCA); 3= air-water heat pump.	F	54 (R/W)				**2 (YLCA)** **3 (YLHA)**
H02	Number of vent circuits (do not modify this parameter)	F	12 (R/W)				**0**
H03	No. of evaporating units present (do not modify this parameter)	F	13 (R/W)				**0**
H04	No. of compressors per circuit (do not modify this parameter)	F	55 (R/W)				**0**
H05	Pump operation 0= absent 1= Always ON 2= ON upon regulator call 3= On under regulator and time call	F	56 (R/W)		3	0	**1**
H06	COOL/HEAT digital intake 0= Absent. 1= Present	U	14 (R/W)		1	0	**0**
H07	ON/OFF digital intake 0= Absent. 1= Present	U	15 (R/W)		1	0	**0**
H08	Network configuration (do not modify this parameter)	F	57 (R/W)		3	0	**0**
H09	Keyboard locked 0= Disabled. 1= Enabled	U	16 (R/W)		1	0	**1**
H10	Serial direction for supervision 0= Future use as terminal	U	58 (R/W)		200	1	**1**
H11	Output configuration (not selectable)	F	59 (R/W)		3	0	**0**
H12	4-way valve logic operation. Activated in cold cycle (do not modify this parameter)	F	60 (R/W)		3	0	**0**
H21	Second pump operation (do not modify this parameter)	F	62 (R/W)		4	0	**0**
H22	Default loading of parameters disabled 1= Disabled. 0= Enabled	F	18 (R/W)		1	0	**1**
H23	Modbus protocol setting 0= Disabled. 1= Enabled	F	11		1	0	**0**

Parameters for alarm configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
P01	Alarm delay by flow switch at start-up.	U	63 (R/W)	Sec.	150	0	**20**
P02	Alarm delay by flow switch with unit in operation.	U	64 (R/W)	Sec.	120	0	**5**
P03	Alarm delay by low pressure switch at start-up.	U	65 (R/W)	Sec.	200	0	**60**
P05	Alarm reset 6= Low and high pressure switch manual reset at third activation in one hour. Antifreeze control is manual reset.	F	67 (R/W)				**6**
P06	Cool and heat cycle symbol. 1= “Sun” heat cycle, “Snow flake” cool cycle. 0= “Sun” cool cycle, “Snow flake” heat cycle.	F	19 (R/W)		1	0	**1**
P08	Digital intake 1 for flow switch. Do not modify this parameter.	F	69 (R/W)				**1**
P09	Digital intake 2 for remote Cool/Heat function. Do not modify this parameter.	F	70 (R/W)				**9**
P15	Low pressure alarm selection. 0= Inoperative with compressor OFF. 1= Operative with compressor OFF.	F	76 (R/W)		1	0	**1**
P16	High temperature alarm of return water.	U	38 (R/W)	°C	80	-40	**30**
P17	High temperature delay at start-up.	U	77 (R/W)	Sec.	250	0	**30**
P18	High pressure alarm by transducer 0= Function disabled.	F	39 (R/W)	bar	99.9	0.1	**41**
P19	Low temperature alarm of return water.	U	40 (R/W)	°C	80	-40	**10**
P20	Alarm activation by high or low water temperature at start-up. 1= Function enabled. 0= Function disabled.	U	20 (R/W)		1	0	**0**

Parameters for regulator configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
r01	Cool cycle set point temperature	U	41 (R/W)	°C	r14	r13	**12**
r02	Cool set point temperature differential	U	42 (R/W)	°C	50	0.3	**1**
r03	Heat cycle set point temperature	U	43 (R/W)	°C	r16	r15	**40**
r04	Heat cycle set point temperature differential	U	44 (R/W)	°C	50	0.3	**2**
r06	Type of adjustment 0= Proportional. Intake temperature. 1= Proportional + neutral zone. Intake temp. 2= Proportional. Output temperature. 3= Proportional + neutral zone. Output temp. 4= By time + dead zone. Output temperature (chillers only).	F	79 (R/W)		4	0	**0**
r07	Neutral zone differential	F	45 (R/W)	°C	50	0	**1**
r08	(If r06=4 only) Maximum activation time. Output temperature.	F	80 (R/W)	Sec.	999	r09	**120**
r09	(If r06=4 only) Minimum activation time. Output temperature.	F	81 (R/W)	Sec.	999	c04	**100**
r10	(If r06=4 only) Maximum deactivation time. Output temperature.	F	82 (R/W)	Sec.	999	r11	**120**
r11	(If r06=4 only) Maximum deactivation time. Output temperature.	F	83 (R/W)	Sec.	999	c05	**100**
r12	(If r06=4 only) Compressor deactivation differential.	F	46 (R/W)	°C	50	0	**1**
r13	Cool cycle minimum set point temperature.	U	47 (R/W)	°C	r14	-40	**6**
r14	Cool cycle maximum set point temperature.	U	48 (R/W)	°C	80	r13	**20**
r15	Heat cycle minimum set point temperature.	U	49 (R/W)	°C	r16	-40	**25**
r16	Heat cycle maximum set point temperature.	U	50 (R/W)	°C	80	r15	**45**
r17	Summer compensation constant	U	51 (R/W)	-	+5	-5	**-0.4**
r18	Maximum set point distance	U	52 (R/W)	°K	20	0.3	**3.2**
r19	Summer compensation start-up temperature	U	53 (R/W)	°C	176	-40	**32**
r20	Winter compensation start-up temperature	U	54 (R/W)	°C	176	-40	**5**
r27	Suppression of buffer tank. 0= No suppression. 1= Suppression in cool cycle. 2= Suppression in heat cycle. 3= Permanent suppression.	F	88 (R/W)		3	0	**3**
r28	Minimum time for determining low charge	F	89 (R/W)	Sec.	999	0	**210**
r29	Low charge differential in cool cycle	F	58 (R/W)	°C	50	0.3	**3**
r30	Low charge differential in heat cycle	F	58 (R/W)	°C	50	0.3	**4**
r31	Winter compensation constant	U	60(R/W)	-	+5	-5	**-0.4**



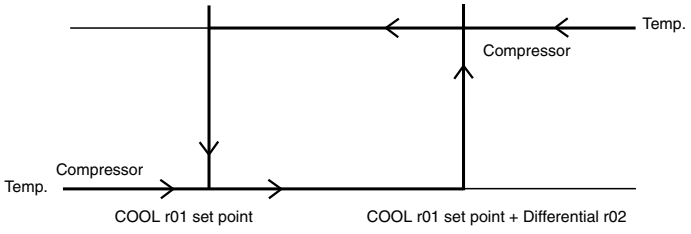


Table of alarms		
Display	**Alarm type**	**Reset**
A1	Antifreeze alarm	Manual
AHt	High temp. at start-up (if activated, P20=1)	Automatic
ALt	Low temp. at start-up (if activated, P20=1)	Automatic
d1-2	Defrost in operation	-
dF1-2	Problem in defrost	Automatic
E1	Probe B1	Automatic
E2	Probe B2	Automatic
E3	Probe B3	Automatic
E4	Probe B4	Automatic
ELS	Low supply voltage	Automatic
EHS	High supply voltage	Automatic
EPr	Eprom error. Unit in operation.	Automatic
EPb	Eprom error. At start-up	Automatic
ESP	Communication failure with expansion module	Automatic
EL	Problem at fan voltage control	Automatic
FL	Flow switch / pump protector	Manual
Hc	Compressor maintenance alarm	Automatic
HP	High pressure/Thermal fan protector	Manual
Ht	High water temperature alarm	Automatic
L	Low charge alarm	-
LP	Low pressure	Manual

Reset of alarms
Pressing the UP and DOWN keys for 5 seconds cancels alarms present in the memory. At the same time, the alarm message disappears from the display and the alarm relay is deactivated.

Forced defrost (heat pumps)
Pressing the SEL and UP keys simultaneously for 5 seconds activates forced defrost of the unit.

Clearing hour counters
While reading compressor or pump (c10 and c15) operating hours, said counters can be cleared by pressing the UP and DOWN keys simultaneously.

Pump operation
4 operating modes can be selected in accordance with the value given to parameter H5. H5=0 (pump disabled), H5=1 (pump permanently on), H5=2 (pump ON controlled by the regulator or in parallel with the compressor), H5=3 (pump goes on and off at regular intervals, independent of compressor operation) (parameters c17 and c18).

Calibration of probes
If necessary, probes can be calibrated by using parameters /13, /14, /15, and /16. See Parameters related to probes table.

Remote ON/OFF
A remote ON/OFF intake can be connected between terminals D5 and B on the connecting strip. To activate said intake, a value of 1 should be given to parameter H07 (H07= 1). With this intake open the unit is OFF; when closed, the unit is ON. This option does not disable the ON/OFF function of the keyboard.

Remote COOL/HEAT
A remote COOL/HEAT intake can be connected between terminals D2 and B on the connecting strip. To activate said intake, a value of 1 should be given to parameter H06 (H06= 1). With this intake open the unit is in HEAT; when closed, the unit is in COOL. This function disables the COOL/HEAT function of the keyboard.

Operating Instructions µC2
YLCA 50, 60 and 80

Description of control unit

This is a multipurpose controller specially programmed for use with air-water chillers and heat pumps equipped with a tandem compressor, two power stages and one single cooling circuit.

Main functions

- Water temperature control (at intake or outlet, as per parameter r6).
- Defrost cycle management.
- System operating and safety management.
- Fan speed control.
- Alarm management.
- Connection for supervision and telephone assistance (accessory serial connection RS485).

Devices controlled

- Compressors
- Fans
- Four-way valve
- Water pump
- Alarm device
- Auxiliary heaters

Standard components

- ***Control base module for system and the first compressor.*** - This is the central nucleus that processes the signals coming from the probes and protection elements of the entire system to control its active elements: compressors and fans, four-way valve, water circulating pump, alarm relay and auxiliary heater. Power supply 24 Vac.

  Can also be used for access and control of the system by means of the display, buttons and LEDs available. Allows selection cool, heat and off functions. Operating parameters can also be modified, and the system can be supervised as well.

- ***Fan speed control module.*** Operates by phase cut-off. Includes fuse.

- ***NTC and ratiometric (pressure) probes.***

  3 NTC probes are used to read system temperatures and a ratiometric pressure transducer (B4) to read refrigerant pressure inside the coil:

  B1. Controls set point. Reads water temperature at exchanger intake.

  B2. Antifreeze control. Reads water temperature at exchanger discharge.

  B3. Controls dynamic set point. Reads outdoor air temperature.

  B4. Fan speed and defrost cycle control. Reads refrigerant pressure inside the coil.

Parameters

The set of parameters that configure the operating program of the unit is divided into four levels (*Factory, Super User, User and Direct*), depending upon the function of each parameter and the user's access level. The parameters of each level can be modified from that same level, as well as lower level parameters.

***Factory* level**

Accessible with the *Factory password*. Allows configuration of all unit parameters.

Super *User level*

Accessible with *Super User password*. Allows setting *Super User, User and Direct* parameters.

***User* level**

Accessible with *password 22*. Allows access to all parameters the user normally sets.

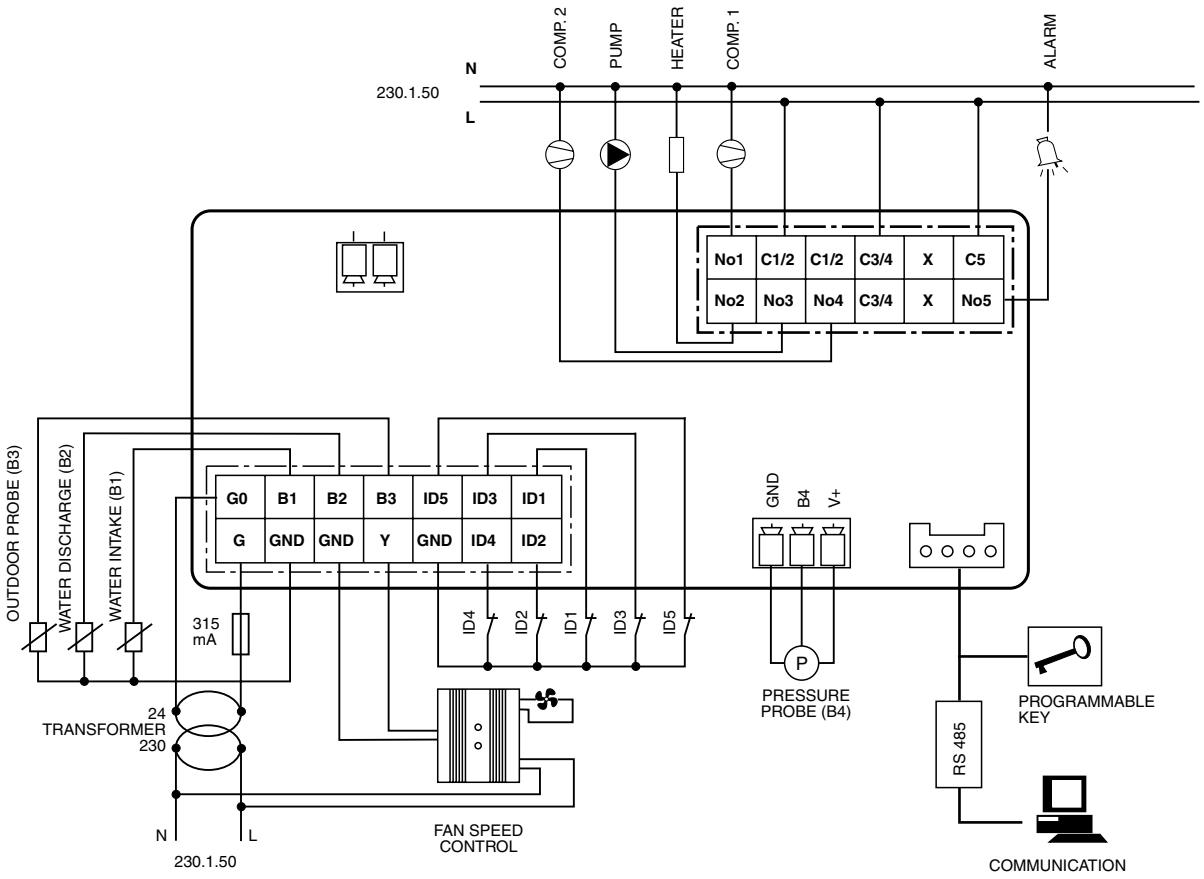
***Direct* level**

Accessible without a *password*. Allows reading the values detected by the probes, as well as other system values. Can be used by the user without affecting unit operation.

General

Modification of the parameters that affect basic unit configuration should be made with the controller in *Standby* position.

General diagram, YLCA 50, 60 and 80

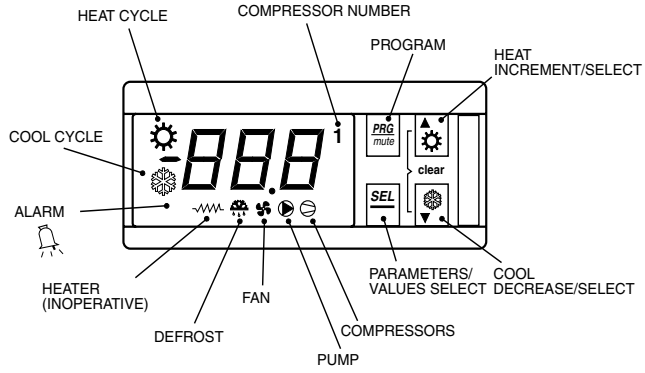


B1: WATER INTAKE TEMPERATURE PROBE (SET POINT CONTROL)
B2: WATER DISCHARGE TEMPERATURE PROBE (ANTIFREEZE PROTECTION)
B3: COIL TEMPERATURE PROBE (DYNAMIC SET POINT)
B4: OUTDOOR RATIOMETRIC PRESSURE PROBE (FAN SPEED AND DEFROST CONTROL)
ID1: WATER FLOW SWITCH
ID2: FAN THERMAL HEAT PROTECTORS
ID3: HIGH PRESSURE SWITCH
ID4: LOW PRESSURE SWITCH
ID5: REMOTE ON/OFF

Symbols on the display

The display has three figures in green, plus a symbol and a decimal. It also shows the symbols, in amber, of the functions selected (the alarm symbol is red).

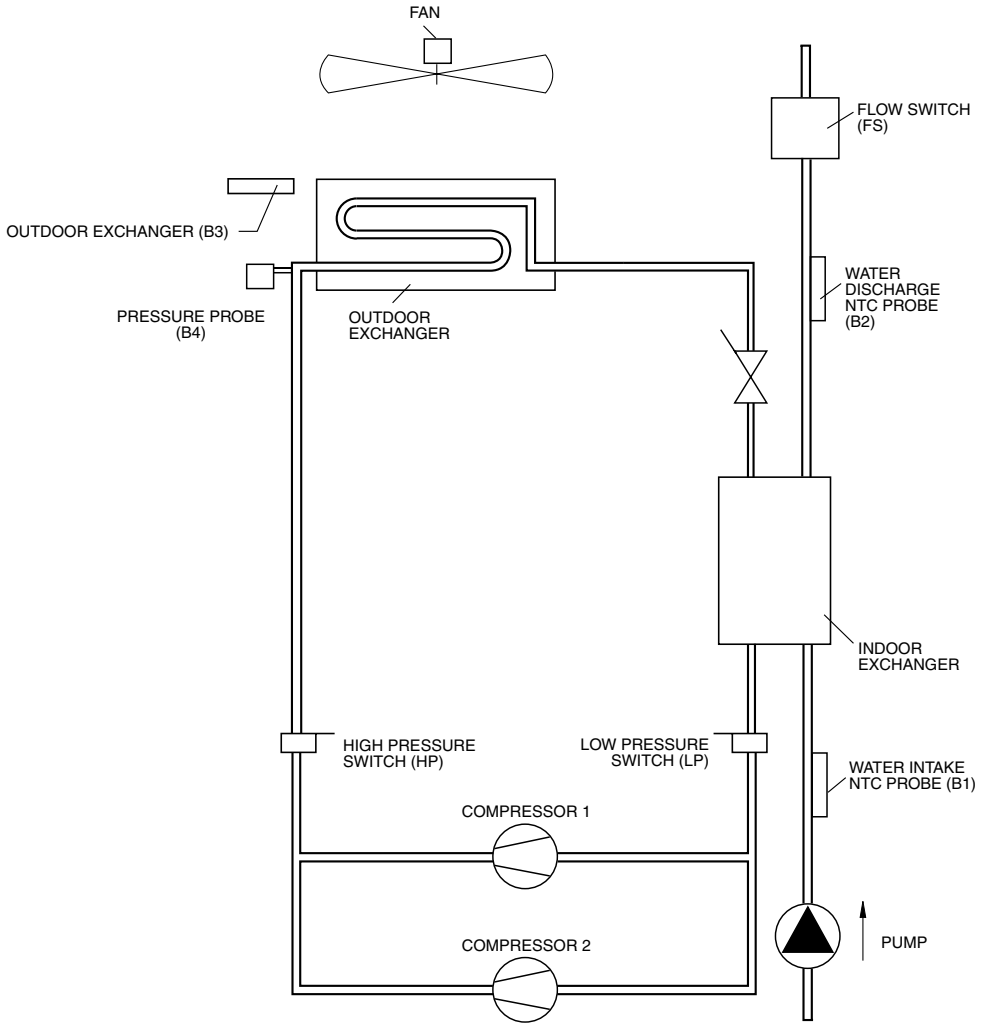
Symbol	Colour	Meaning	
		Red LED on constantly	Red LED flashing
1;2	Amber	Compressor 1 and/or 2 in operation	Timing start-up
		Compressors on call	-
		Water pump in operation	-
		Fans in operation	-
		Defrost activated	-
	Red	Alarm activated	-
	Amber	Cool cycle	-
		Heat cycle	-



Functions of remote control unit buttons

BUTTON	UNIT STATUS	PRESSING
Prg/mute	Carga los valores por Loads values by default	Applies voltage when pressed
	Return to superior sub-group within programming area until output of same (except changes in E2PROM)	Simply press
Sel	Access to *Direct* parameters	Press 5 seconds
	Selects a *Direct* parameter and shows its value / Confirms parameter changes	Simply press
Prg+Sel	Programming parameters with *password*	Press 5 seconds
▲ ☼	Selects superior parameter within the programming area	Simply press or continuous
	Increase value	Simply press or continuous
	Selects heat function from *standby* position and *vice-versa* (P6=1)	Press 5 seconds
▼ ❄	Selects lower parameter within programming area	Simply press or continuous
	Lower value	Simply press or continuous
	Selects cool function from *standby* position and *vice-versa* (P6=1)	Press 5 seconds
▲ ☼ + ▼ ❄	Manual alarm reset	Press 5 seconds
	Clears hour counters (within programming area)	Press 5 seconds
Sel + ☼	Forced manual defrost	Press 5 seconds

Location of controls



Parameter tables

The following tables show the parameters and their values divided into groups.

Parameter level codes

D = *Direct*
U = *User*
S = *Super User*
F = *Factory*

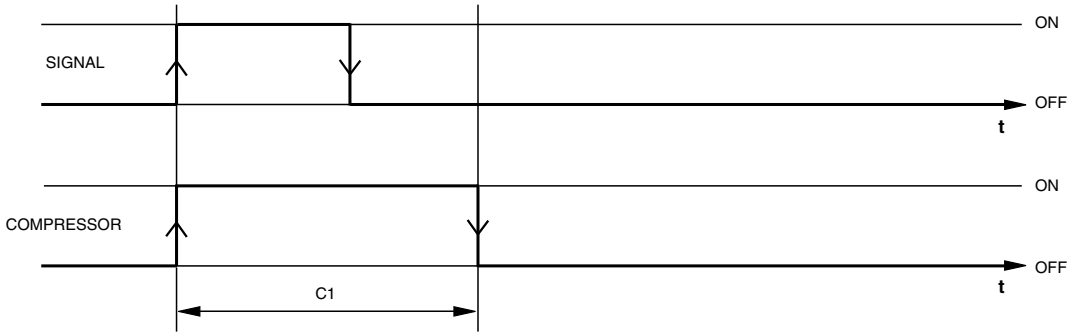
Variables for supervision (VS)

R/W = Read/write parameter
R = Read only parameter

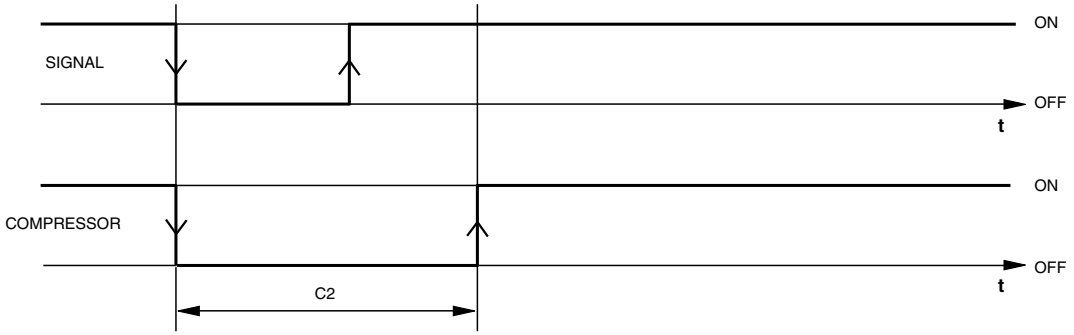
Parameters related to the probes							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
/01	NTC B1 probe (water intake); 0=absent (function not available). 1=present	F	1 (R/W)	-	1	0	**1**
/02	NTC B2 probe (water outlet). 0=absent (function not available). 1=present	F	2 (R/W)	-	1	0	**1**
/03	NTC B3 probe . 1=condensation probe. 2=outdoor probe.	F	14 (R/W)	-	1	0	**2**
/04	Probe type B4, 0=absent, 1=ON/OFF, 2=outdoor NTC probe, 3=ratiometric 5Vdc.	F	15 (R/W)	-	3	0	**3**
/09	Minimum input voltage	F	18 (R/W)	0.01 Vdc	/10	0	**50**
/10	Maximum input voltage	F	19 (R/W)	0.01 Vdc	500	/09	**450**
/11	Minimum pressure	F	1 (R/W)	bar	/12	0	**0**
/12	Maximum pressure	F	2 (R/W)	bar	99.9	/11	**45**
/13	Calibration probe B1	F	3 (R/W)	°C	12	-12	**0**
/14	Calibration probe B2	F	4 (R/W)	°C	12	-12	**0**
/15	Calibration probe B3	F	5 (R/W)	°C	12	-12	**0**
/16	Calibration probe B4	F	6 (R/W)	bar	12	-12	**0**
/21	Digital filter	U	20 (R/W)	-	15	1	**4**
/22	Input limitation	U	21 (R/W)	-	15	1	**8**
/23	Measuring unit 0 = C; 1 = 1F	U	5 (R/W)	-	1	0	**0**
b00	Probe viewed on display	U	24 (R/W)	-	7	0	**0**
b01	Value read by probe B1	D	70 (R)	°C	-	-	**-**
b02	Value read by probe B2	D	71 (R)	°C	-	-	**-**
b03	Value read by probe B3	D	72 (R)	°C	-	-	**-**
b04	Value read by probe B4	D	73 (R)	°C/bar	-	-	**-**

Parameters related to the probes							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
c01	Minimum operating time	U	25 (R/W)	Sec.	999	0	**120**
c02	Minimum OFF time	U	26 (R/W)	Sec.	999	0	**60**
c03	Time between start-ups of the same compressor	U	27 (R/W)	Sec.	999	0	**300**
c06	Start-up timing	U	30 (R/W)	Sec.	999	0	**10**
c07	Compressor start-up delay with regard to the pump	U	31 (R/W)	Sec.	150	0	**20**
c08	Pump OFF delay with regard to the compressor	U	32 (R/W)	Min.	150	0	**1**
c10	Operating hour counter for compressor	D	90 (R)	Hours	800	0	-
c14	Operating hour counter for compressor maintenance	U	34 (R/W)	Hours	100	0	**0**
c15	Operating hour counter for pump	D	94 (R/W)	Hours	800	0	-
c17	Minimum time between pump start-ups	U	35 (R/W)	Min.	150	0	**5**
c18	Minimum operating time for pump	U	36 (R/W)	Min.	15	0	**1**

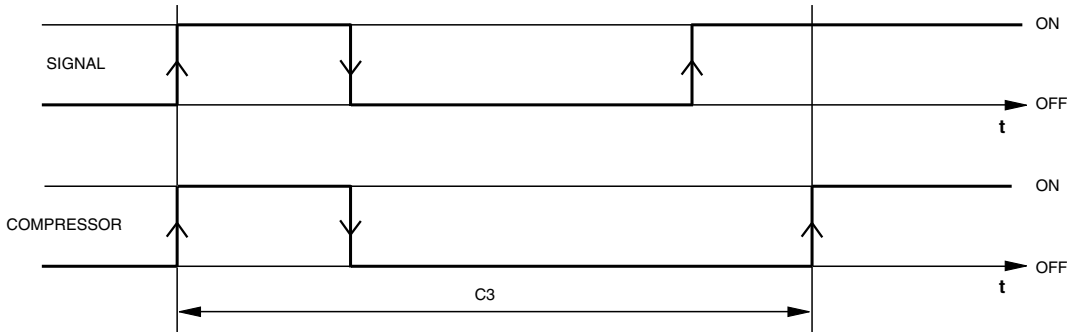
Minimum operating time of a compressor



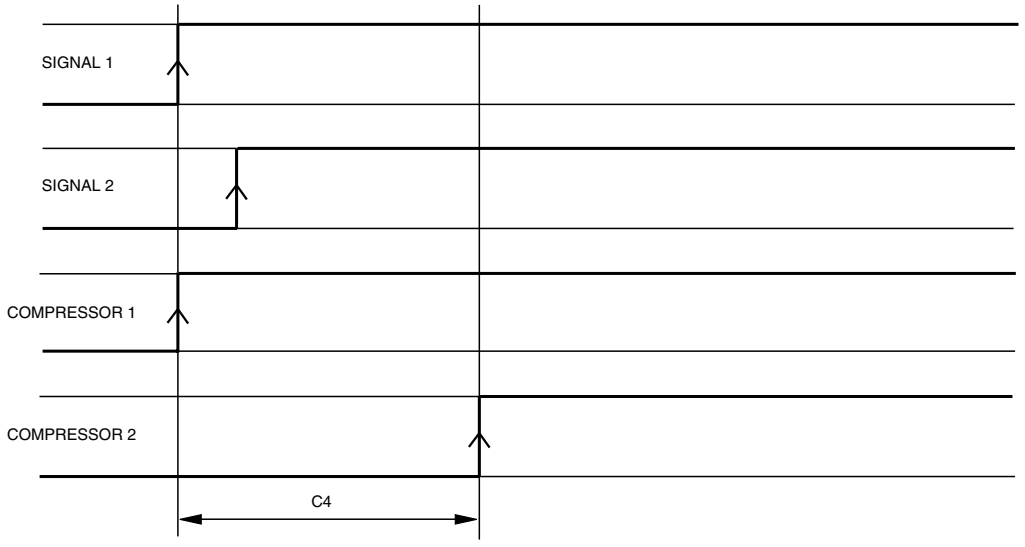
Minimum OFF time of a compressor



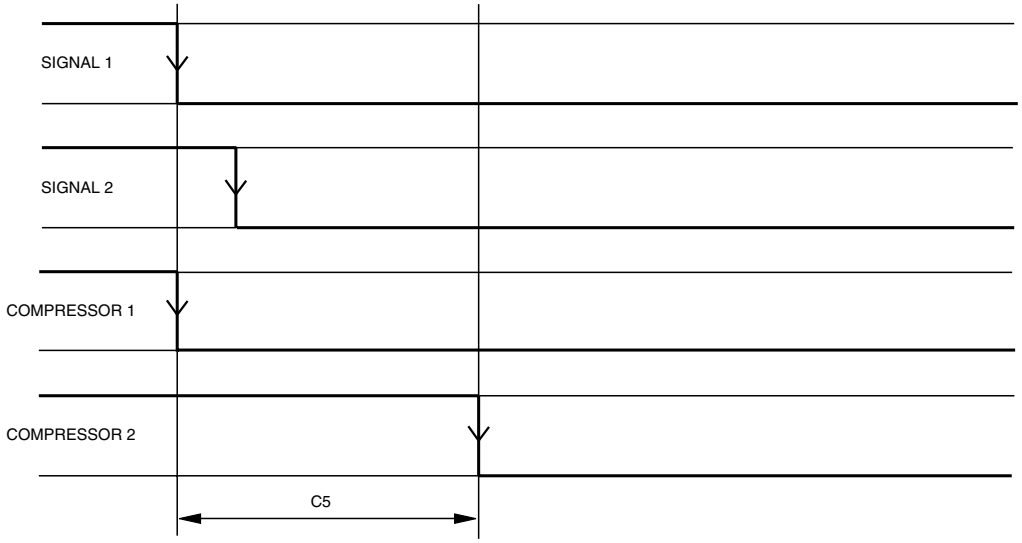
Minimum time between compressor start-ups



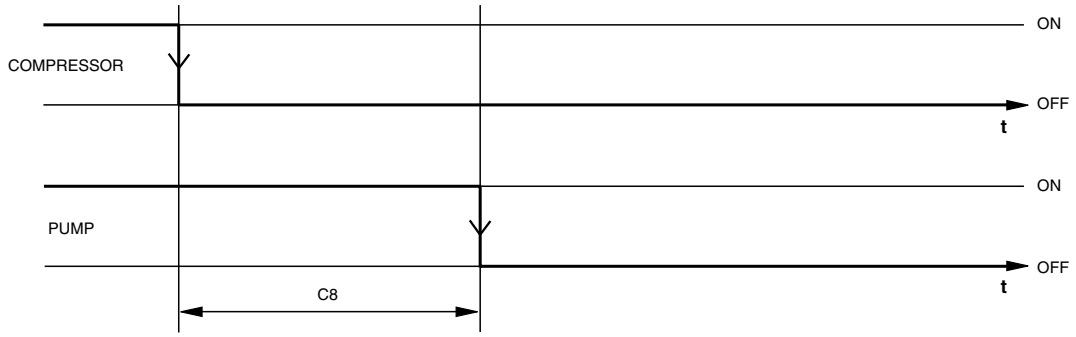
Time between start-ups of two compressors



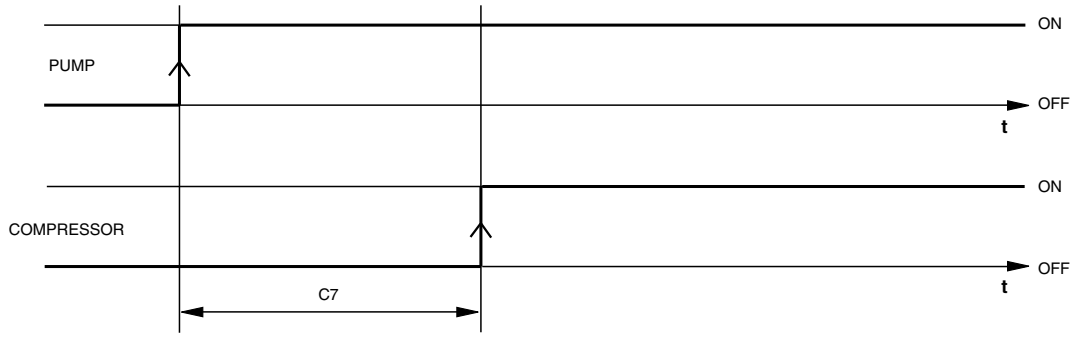
Time between OFF of two compressors



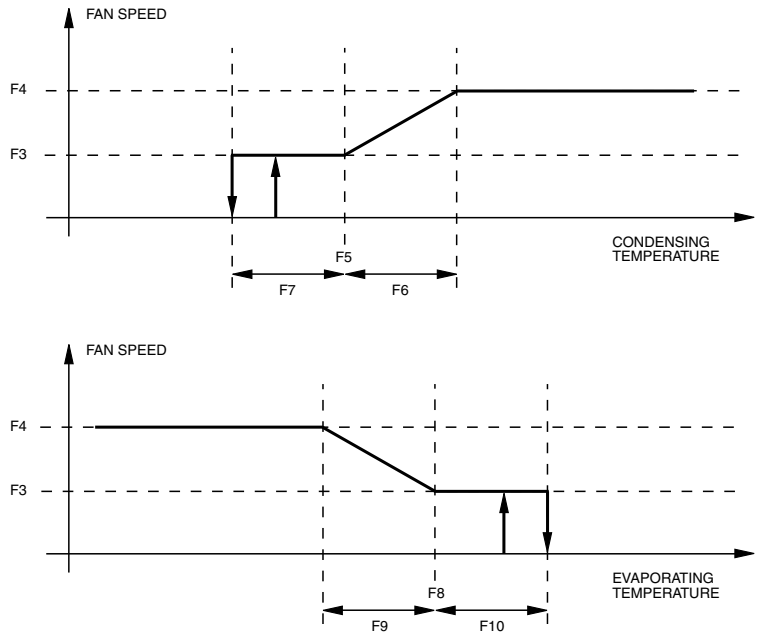
Compressor/pump OFF delays



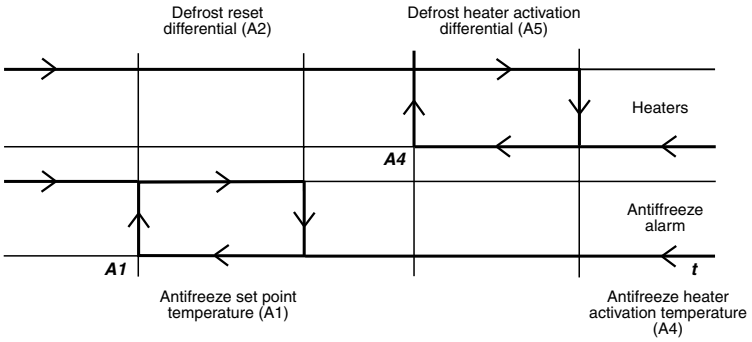
Pump/compressor start-up delays



Parameters related to the fans							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
F01	Fan outlet. 0=absent (function not available); 1=present	F	10 (R/W)		1	0	**1**
F02	Operating mode: 0= always ON (function not available) 1= Parallel with compressor (function not available) 2= ON/OFF operation (function not available) 3= Parallel with compressor and speed adjustment.	U	48 (R/W)		3	0	**3**
F03	Minimum triac voltage	F	49 (R/W)	step	F04	0	**50**
F04	Maximum triac voltage	F	50 (R/W)	step	100	F03	**85**
F05	Cool cycle minimum speed pressure	F	24 (R/W)	bar	80	-40	**22.2**
F06	Cool cycle maximum speed pressure differential	F	26 (R/W)	bar	50	0	**3.7**
F07	Cool cycle fan OFF pressure differential	F	28 (R/W)	bar	50	0	**6.5**
F11	Fan start-up time	F	51 (R/W)	Sec.	120	0	**10**
F12	Triac impulse duration	F	52 (R/W)	Sec.	10	0	**2**
F14	Fan in operation when starting with high ambient temperature	U	91 (R/W)	Sec.	999	0	**30**



Parameters related to defrost control configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
A01	Antifreeze control set point temperature	U	11 (R/W)	°C	-	A07	**3**
A02	Antifreeze reset differential	U	12 (R/W)	°K	50	0.3	**5**
A03	Antifreeze alarm bypass time	U	22 (R/W)	Sec.	150	0	**0**
A04	Antifreeze heater activation temperature	U	13 (R/W)	°C	r16	A01	**3**
A05	Antifreeze heater activation differential	U	14 (R/W)	°K	50	0.3	**2**
A06	Backup heater control probe 0= control probe 1= antifreeze probe	F	6 (R/W)	-	1	0	**0**
A07	Minimum level antifreeze control set point temperature	U	15 (R/W)	°C	79	-40	**3**
A08	Heating heater activation set point temperature	U	16 (R/W)	°C	r15	A01	**3**
A09	Heating heater deactivation set point temperature differential	U	17 (R/W)	°C	50	0.3	**3**
A10	Automatic start-up by antifreeze alarm (unit in standby) 0= function deactivated 1= Water pump + heater 2= Water pump + heater + compressor (heat pumps only) 3= Heater	U	23 (R/W)		3	0	**1**



Parameters for unit configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
H01	Unit model. 2= air-water chiller (LCA); 3= air-water heat pump.	F	54 (R/W)				**2**
H02	Number of vent circuits (do not modify this parameter)	F	12 (R/W)				**0**
H03	No. of evaporating units present (do not modify this parameter)	F	13 (R/W)				**0**
H04	No. of compressors per circuit (do not modify this parameter)	F	55 (R/W)				**1**
H05	Pump operation 0= absent 1= Always ON 2= ON upon regulator call 3= On under regulator and time call	F	56 (R/W)		3	0	**1**
H06	COOL/HEAT digital intake 0= Absent. 1= Present	U	14 (R/W)		1	0	**0**
H07	ON/OFF digital intake 0= Absent. 1= Present	U	15 (R/W)		1	0	**0**
H08	Network configuration (do not modify this parameter)	F	57 (R/W)		3	0	**0**
H09	Keyboard locked 0= Disabled. 1= Enabled	U	16 (R/W)		1	0	**1**
H10	Serial direction for supervision 0= Future use as terminal	U	58 (R/W)		200	1	**1**
H11	Output configuration (not selectable)	F	59 (R/W)		3	0	**1**
H12	4-way valve logic operation. Activated in cold cycle (do not modify this parameter)	F	60 (R/W)		3	0	**0**
H21	Second pump operation (do not modify this parameter)	F	62 (R/W)		4	0	**0**
H22	Default loading of parameters disabled 1= Disabled. 0= Enabled	F	18 (R/W)		1	0	**1**
H23	Modbus protocol setting 0= Disabled. 1= Enabled	F	11		1	0	**0**

Parameters for alarm configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
P01	Alarm delay by flow switch at start-up.	U	63 (R/W)	Sec.	150	0	**20**
P02	Alarm delay by flow switch with unit in operation.	U	64 (R/W)	Sec.	120	0	**5**
P03	Alarm delay by low pressure switch at start-up.	U	65 (R/W)	Sec.	200	0	**60**
P04	Partialization in HP Prevent high pressure 0= Inactive. 1= Active.	U	66 (R/W)		1	0	**1**
P05	Alarm reset 6= Low and high pressure switch manual reset at third activation in one hour. Antifreeze control is manual reset.	F	67 (R/W)				**6**
P06	Cool and heat cycle symbol. 1= “Sun” heat cycle, “Snow flake” cool cycle. 0= “Sun” cool cycle, “Snow flake” heat cycle.	F	19 (R/W)		1	0	**1**
P08	Digital intake 1 for flow switch. Do not modify this parameter.	F	69 (R/W)				**1**
P09	Digital intake 2 for fan thermal protectors.	F	70 (R/W)				**6**
P15	Low pressure alarm selection. 0= Inoperative with compressor OFF. 1= Operative with compressor OFF.	F	76 (R/W)		1	0	**1**
P16	High temperature alarm of return water.	U	38 (R/W)	°C	80	-40	**30**
P17	High temperature delay at start-up.	U	77 (R/W)	Sec.	250	0	**30**
P18	High pressure alarm by transducer 0= Function disabled.	F	39 (R/W)	bar	99.9	0.1	**41**
P19	Low temperature alarm of return water.	U	40 (R/W)	°C	80	-40	**10**
P20	Alarm activation by high and low water temperature at start-up. 1= Function enabled. 0= Function disabled.	U	20 (R/W)		1	0	**0**

Parameters for controller configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
r01	Cool cycle set point temperature	U	41 (R/W)	°C	r14	r13	**12**
r02	Cool set point temperature differential	U	42 (R/W)	°C	50	0.3	**2**
r05	Compressor rotation 0 = Disabled 1 = FIFO type 2 = By operating hours	F	78 (R/W)		2	0	**2**
r06	Type of adjustment 0= Proportional. Intake temperature. 1= Proportional + neutral zone. Intake temp. 2= Proportional. Output temperature. 3= Proportional + neutral zone. Output temp. 4= By time + dead zone. Output temperature (chillers only).	F	79 (R/W)		4	0	**0**
r07	Neutral zone differential	F	45 (R/W)	°C	50	0	**1**
r08	(If r06=4 only) Maximum activation time. Output temperature.	F	80 (R/W)	Sec.	999	r09	**120**
r09	(If r06=4 only) Minimum activation time. Output temperature.	F	81 (R/W)	Sec.	999	c04	**100**
r10	(If r06=4 only) Maximum deactivation time. Output temperature.	F	82 (R/W)	Sec.	999	r11	**120**
r11	(If r06=4 only) Maximum deactivation time. Output temperature.	F	83 (R/W)	Sec.	999	c05	**100**
r12	(If r06=4 only) Compressor deactivation differential.	F	46 (R/W)	°C	50	0	**1**
r13	Cool cycle minimum set point temperature.	U	47 (R/W)	°C	r14	-40	**6**
r14	Cool cycle maximum set point temperature.	U	48 (R/W)	°C	80	r13	**20**
r15	Heat cycle minimum set point temperature.	U	49 (R/W)	°C	r16	-40	**25**

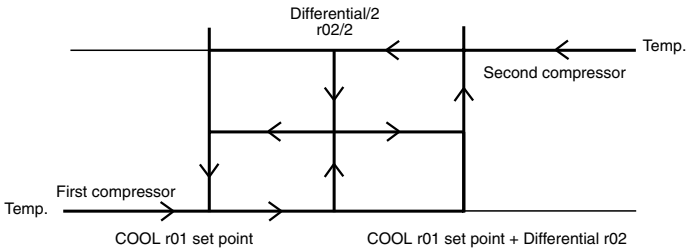


Table of alarms		
Display	**Alarm type**	**Reset**
A1	Antifreeze alarm	Manual
AHt	High temp. at start-up (if activated, P20=1)	Automatic
ALt	Low temp. at start-up (if activated, P20=1)	Automatic
E1	Probe B1	Automatic
E2	Probe B2	Automatic
E3	Probe B3	Automatic
E4	Probe B4	Automatic
ELS	Low supply voltage	Automatic
EHS	High supply voltage	Automatic
EPr	Eprom error. Unit in operation.	Automatic
EPb	Eprom error. At start-up	Automatic
EL 1-2	Problem at fan voltage control	Automatic
FL	Flow switch	Manual
Hc1/Hc2	Compressor maintenance alarm	Automatic
HP	High pressure	Manual
Ht	High water temperature alarm	Automatic
LP	Low pressure	Manual
PC1	Partialization of compressors (high pressure)	Automatic
tC1	Fan thermal protectors	Manual

Reset of alarms
Pressing the UP and DOWN keys for 5 seconds cancels alarms present in the memory. At the same time, the alarm message disappears from the display and the alarm relay is deactivated.

Clearing hour counters
While reading compressor or pump (c10, c11 and c15) operating hours, said counters can be cleared by pressing the UP and DOWN keys simultaneously.

Pump operation
4 operating modes can be selected in accordance with the value given to parameter H5. H5=0 (pump disabled), H5=1 (pump permanently on), H5=2 (pump ON controlled by the regulator or in parallel with the compressor), H5=3 (pump goes on and off at regular intervals, independent of compressor operation) (parameters c17 and c18).

Calibration of probes
If necessary, probes can be calibrated by using parameters /13, /14, /15, /16, /19 and /20. See *Parameters related to probes* table.

Remote ON/OFF
A remote ON/OFF intake can be connected between terminals D5 and B on the connecting strip. To activate said intake, a value of 1 should be given to parameter H07 (H07= 1). With this intake open the unit is OFF; when closed, the unit is ON. This option does not disable the ON/OFF function of the keyboard.

Partialization of compressors in (HP Prevent) high pressure
This function is activated if P04 = 1. If for any reason the high pressure is near the disconnecting point (P18-0.5 bar), this control deactivates one of the compressors and waits 10 seconds. After this interval, if the alarm persists, the unit is turned off. If, on the other hand, the alarm disappears, the unit will continue to operate with one single compressor. In this situation, the message PC1 appears on screen. This condition will remain activated until the pressure drops below the F5 + F6 value. In this case, the unit recovers the previously deactivated compressor.

Operating Instructions µC2 + Expansion YLHA 50, 60 and 80

Description of control unit

This is a multipurpose controller specially programmed for use with air-water chillers and heat pumps equipped with a tandem compressor, two power stages and one single cooling circuit.

Main functions

- Water temperature control (at intake or outlet, as per parameter r6).
- Defrost cycle management.
- System operating and safety management.
- Fan speed control.
- Alarm management.
- Connection for supervision and telephone assistance (accessory serial connection RS485).

Devices controlled

- Compressors
- Fans
- Four-way valve
- Water pump
- Alarm device
- Heaters

Standard components

- ***Control base module for system and the first compressor.*** - This is the central nucleus that processes the signals coming from the probes and protection elements of the entire system to control its active elements: compressor 1, fans, four-way valve, water circulating pump, alarm relay and antifreeze heater. Power supply 24 Vac.

  Can also be used for access and control of the system by means of the display, buttons and LEDs available. Allows selection cool, heat and off functions. Operating parameters can also be modified, and the system can be supervised as well.

- ***Expansion and second compressor control module.*** - This is an expansion of the base module to which it should be connected by means of two cables. It controls the operation of the second compressor.

- ***Fan speed control module.*** Operates by phase cut-off. Includes fuse.

- ***NTC and ratiometric (pressure) probes.***
  3 NTC probes are used to read system temperatures and a ratiometric pressure transducer (B4) to read refrigerant pressure inside the coil:
  B1. Controls set point. Reads water temperature at exchanger intake.
  B2. Antifreeze control. Reads water temperature at exchanger discharge.
  B3. Controls dynamic set point. Reads outdoor air temperature.
  B4 and B8. Fan speed and defrost cycle control. Read refrigerant pressure inside the coil.

Parameters

The set of parameters that configure the operating program of the unit is divided into four levels (*Factory, Super User, User and Direct*), depending upon the function of each parameter and the user's access level. The parameters of each level can be modified from that same level, as well as lower level parameters.

***Factory* level**

Accessible with the *Factory password*. Allows configuration of all unit parameters.

***Super User* level**

Accessible with *Super User password*. Allows setting *Super User, User and Direct* parameters.

***User* level**

Accessible with *password 22.* Allows access to all parameters the user normally sets.

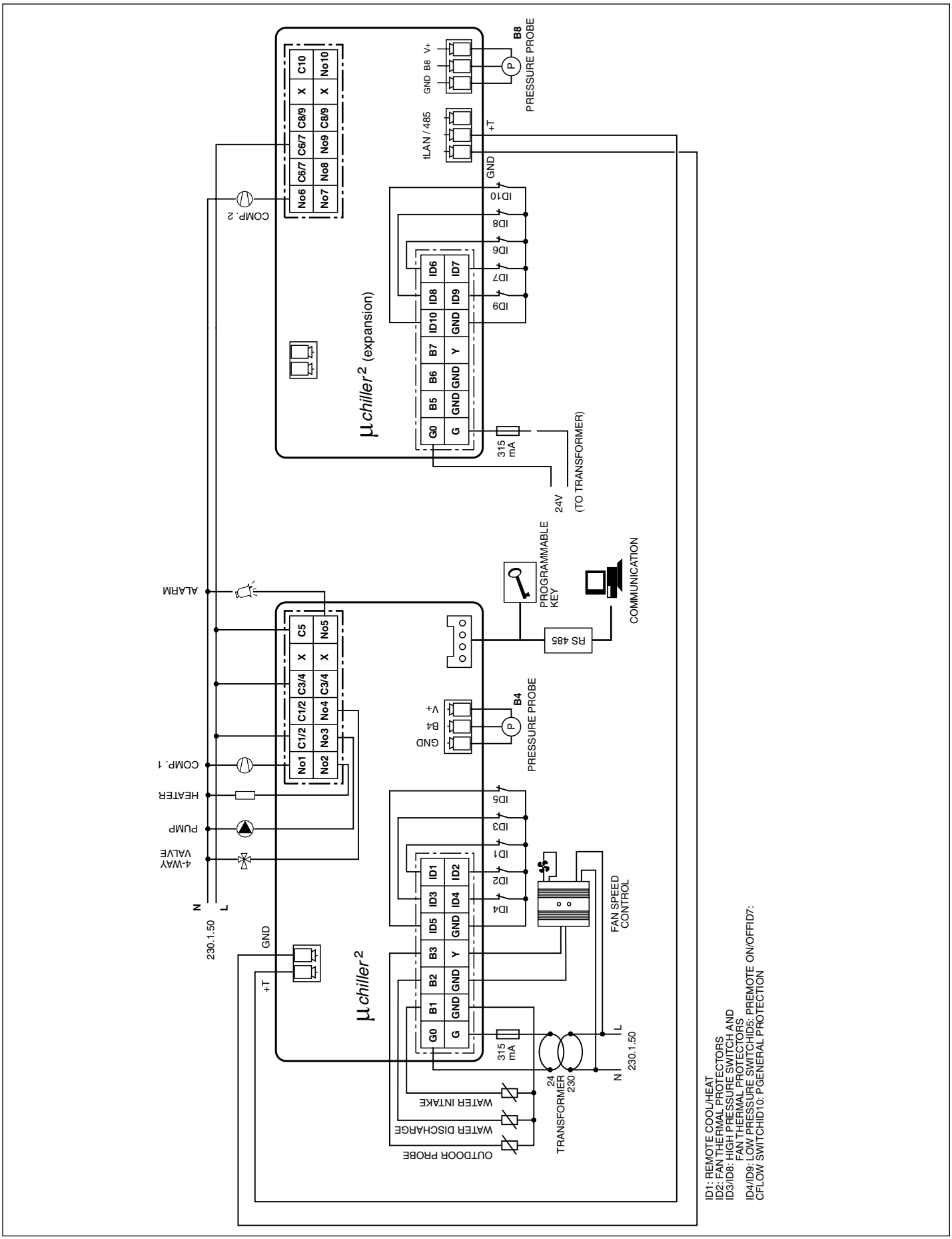
***Direct* level**

Accessible without a *password*. Allows reading the values detected by the probes, as well as other system values. Can be used by the user without affecting unit operation.

General

Modification of the parameters that affect basic unit configuration should be made with the controller in *Standby* position.

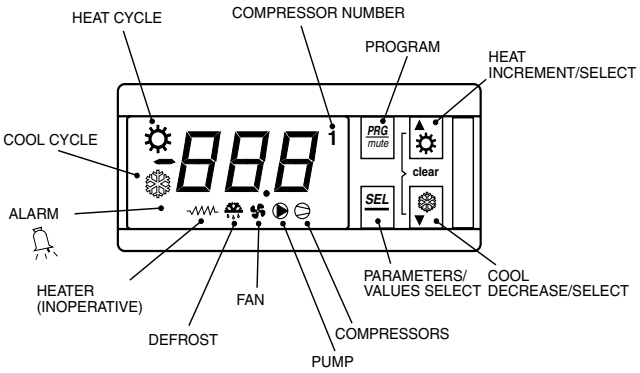
General diagram



Symbols on the display

The display has three figures in green, plus a symbol and a decimal. It also shows the symbols, in amber, of the functions selected (the alarm symbol is red).

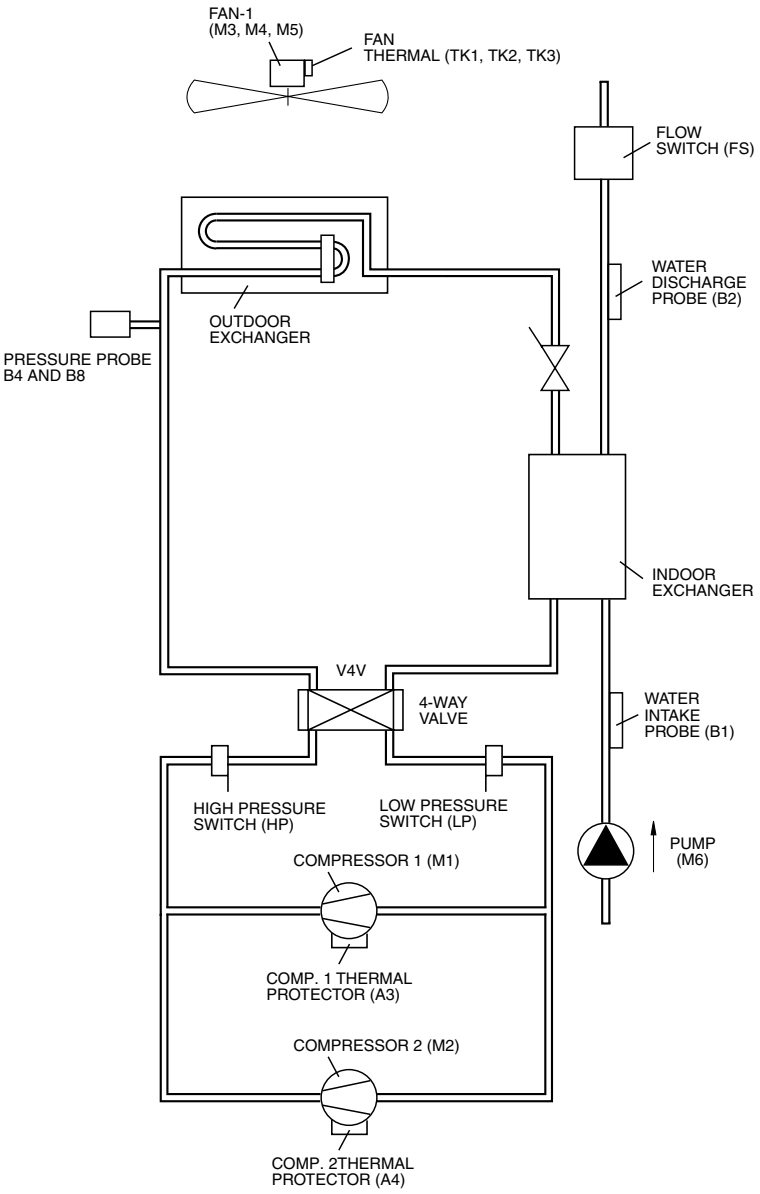
Symbol	Colour	Meaning	
		Red LED on constantly	Red LED flashing
1;2	Amber	Compressor 1 and/or 2 in operation	Timing start-up
		Compressors on call	-
		Water pump in operation	-
		Fans in operation	-
		Defrost activated	-
	Red	Alarm activated	-
	Amber	Cool cycle	-
		Heat cycle	-



Functions of remote control unit buttons

BUTTON	UNIT STATUS	PRESSING
Prg/mute	Loads values by default	Applies voltage when pressed
	Return to superior sub-group within programming area until output of same (except changes in E2PROM)	Simply press
Sel	Access to *Direct* parameters	Press 5 seconds
	Selects a *Direct* parameter and shows its value / Confirms parameter changes	Simply press
Prg+Sel	Programming parameters with password	Press 5 seconds
▲	Selects superior parameter within the programming area	Simply press or continuous
	Increase value	Simply press or continuous
	Selects heat function from *standby* position and *vice-versa* (P6=1)	Pulsar 5 segundos
▼	Selects lower parameter within programming area	Simply press or continuous
	Lower value	Simply press or continuous
	Selects cool function from *standby* position and *vice-versa* (P6=1)	Press 5 seconds
▲ + ▼	Manual alarm reset	Press 5 seconds
	Clears hour counters (within programming area)	Press 5 seconds
Sel +	Forced manual defrost	Press 5 seconds

Location of controls



Parameter tables

The following tables show the parameters and their values divided into groups.

S = *Super User*
F = *Factory*

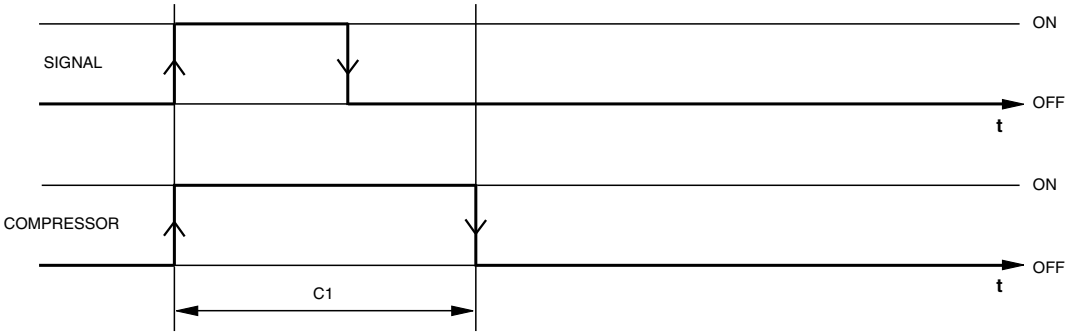
Parameter level codes
D = *Direct*
U = *User*

Variables for supervision (VS)
R/W = Read/write parameter
R = Read only parameter

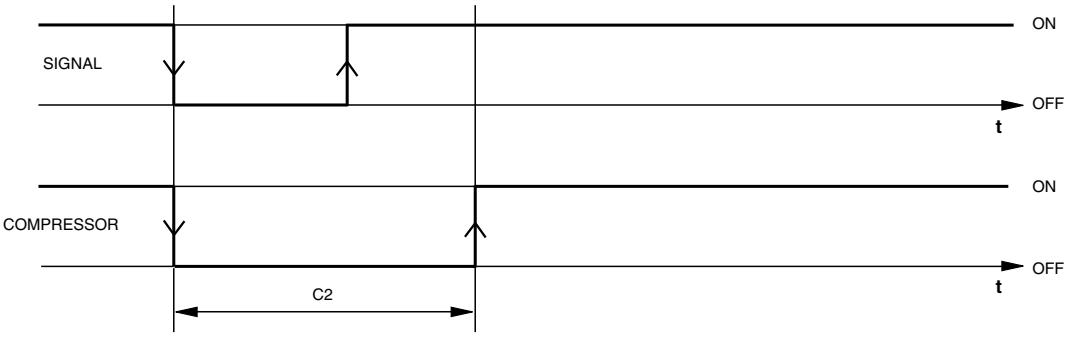
Parameters related to the probes							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
/01	NTC B1 probe (water intake); 0=absent (function not available). 1=present	F	1 (R/W)	-	1	0	**1**
/02	NTC B2 probe (water outlet). 0=absent (function not available). 1=present	F	2 (R/W)	-	1	0	**1**
/03	NTC B3 probe . 1=condensation probe. 2=outdoor probe.	F	14 (R/W)	-	1	0	**2**
/04	Probe type B4, 0=absent, 1=ON/OFF, 2= NTC probe, 3=ratiometric 5Vdc.	F	15 (R/W)	-	3	0	**3**
/08	Probe type B8. 0=absent, 1=ON/OFF, 2=NTC, 3=5Vdc.	F	17(R/W)	-	3	0	**3**
/09	Minimum input voltage	F	18 (R/W)	0.01 Vdc	/10	0	**50**
/10	Maximum input voltage	F	19 (R/W)	0.01 Vdc	500	/09	**450**
/11	Minimum pressure	F	1 (R/W)	bar	/12	0	**0**
/12	Maximum pressure	F	2 (R/W)	bar	99.9	/11	**45**
/13	Calibration probe B1	F	3 (R/W)	°C	12	-12	**0**
/14	Calibration probe B2	F	4 (R/W)	°C	12	-12	**0**
/15	Calibration probe B3	F	5 (R/W)	°C	12	-12	**0**
/16	Calibration probe B4 (accessory)	F	6 (R/W)	bar	12	-12	**0**
/19	Calibration probe B7	F	9 (R/W)	°C	12	-12	**0**
/20	Calibration probe B8 (accessory)	F	10 (R/W)	bar	12	-12	**0**
/21	Digital filter	U	20 (R/W)	-	15	1	**4**
/22	Input limitation	U	21 (R/W)	-	15	1	**8**
/23	Measuring unit 0 = C; 1 = 1F	U	5 (R/W)	-	1	0	**0**
b00	Probe viewed on display	U	24 (R/W)	-	7	0	**0**
b01	Value read by probe B1	D	70 (R)	°C	-	-	**-**
b02	Value read by probe B2	D	71 (R)	°C	-	-	**-**
b03	Value read by probe B3	D	72 (R)	°C	-	-	**-**
b04	Value read by probe B4	D	73 (R)	bar	-	-	**-**
b7	Value read by probe B7	D	76 (R)	°C	-	-	**-**
b08	Value read by probe B8	D	77 (R)	bar	-	-	**-**

Parameters related to the probes							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
c01	Minimum operating time	U	25 (R/W)	Sec.	999	0	**120**
c02	Minimum OFF time	U	26 (R/W)	Sec.	999	0	**60**
c03	Time between start-ups of the same compressor	U	27 (R/W)	Sec.	999	0	**300**
c04	Time between start-ups of two compressors	U	28 (R/W)	Sec.	999	0	**3**
c05	Time between OFF of two compressors	U	29 (R/W)	Sec.	999	0	**3**
c06	Start-up timing	U	30 (R/W)	Sec.	999	0	**10**
c07	Compressor start-up delay with regard to the pump	U	31 (R/W)	Sec.	150	0	**20**
c08	Pump OFF delay with regard to the compressor	U	32 (R/W)	Min.	150	0	**1**
c10	Operating hour counter for compressor 1	D	90 (R)	Hours	800	0	-
c11	Operating hour counter for compressor 2	D	91 (R)	Hours	800	0	-
c14	Operating hour counter for compressor maintenance	U	34 (R/W)	Hours	100	0	**0**
c15	Operating hour counter for pump	D	94 (R/W)	Hours	800	0	-
c17	Minimum time between pump start-ups	U	35 (R/W)	Min.	150	0	**5**
c18	Minimum operating time for pump	U	36 (R/W)	Min.	15	0	**2**

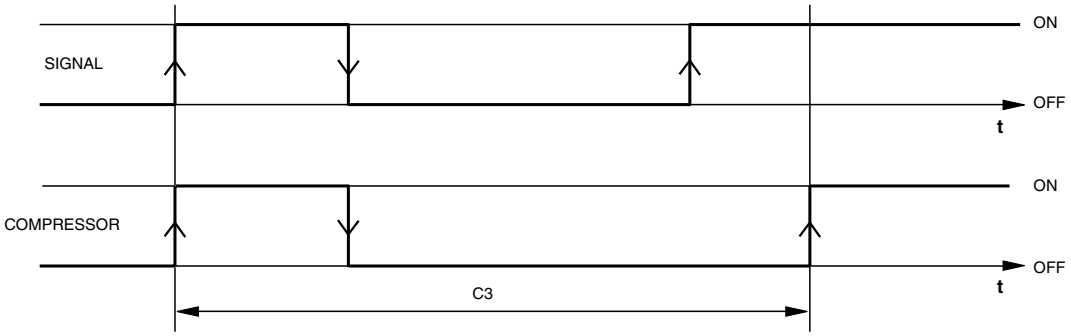
Minimum operating time of a compressor



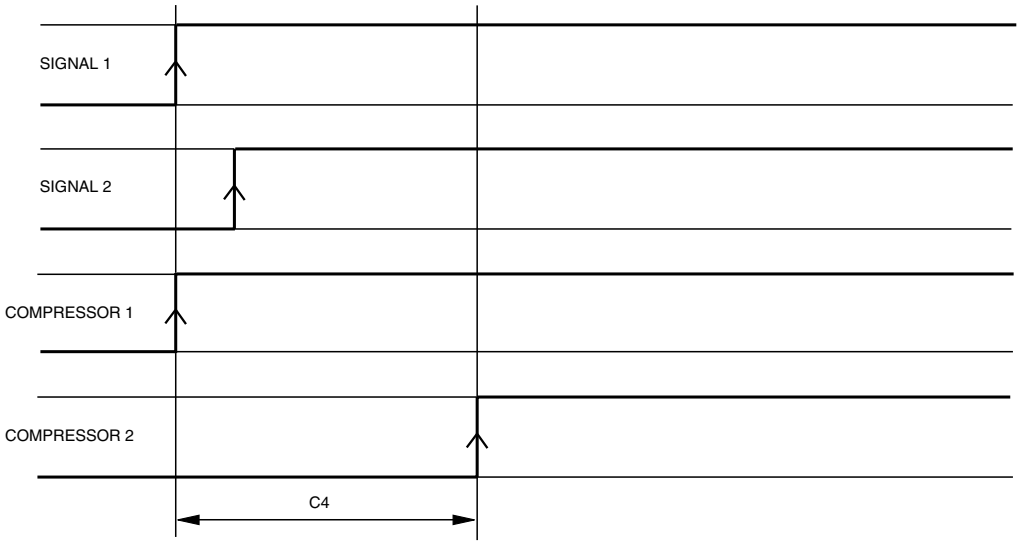
Minimum OFF time of a compressor



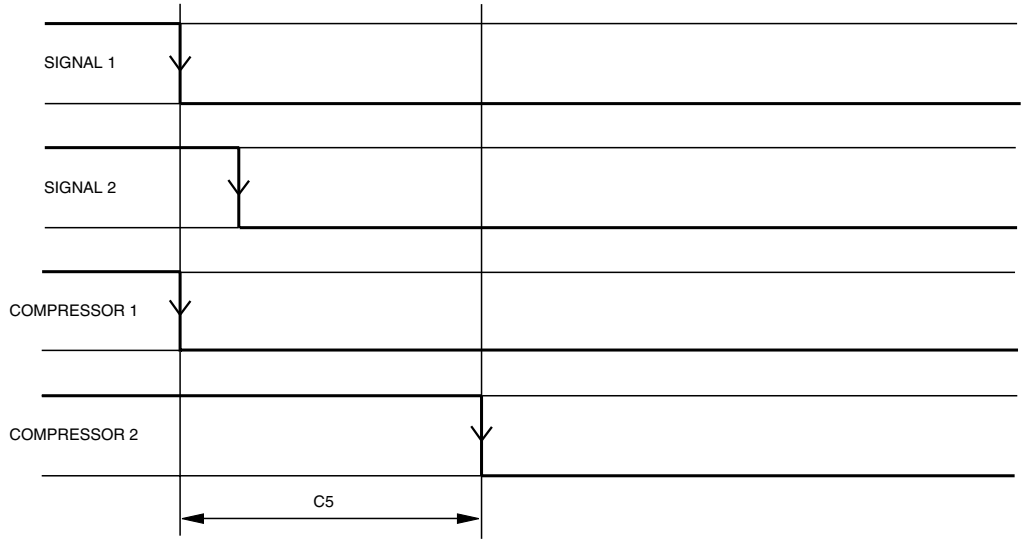
Minimum time between compressor start-ups



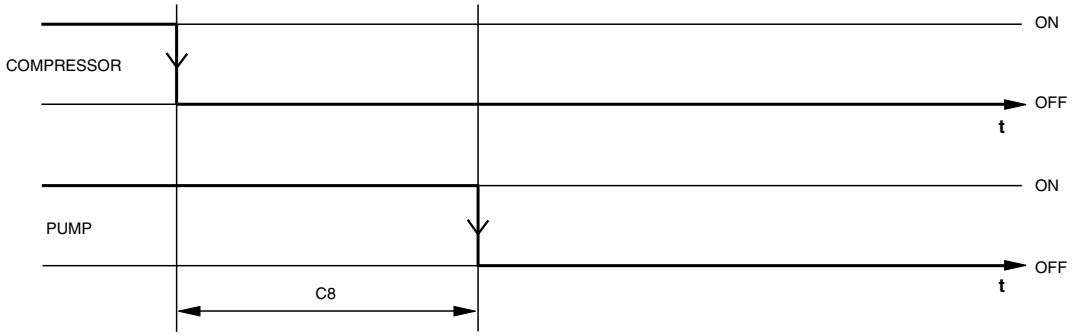
Time between start-ups of two compressors



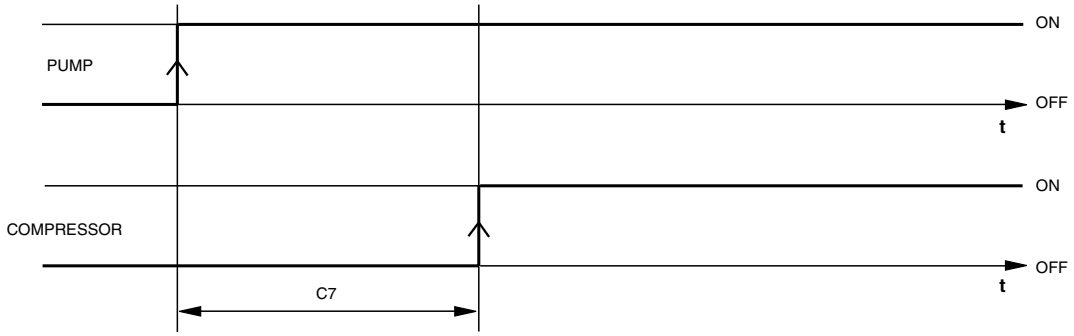
Time between OFF of two compressors



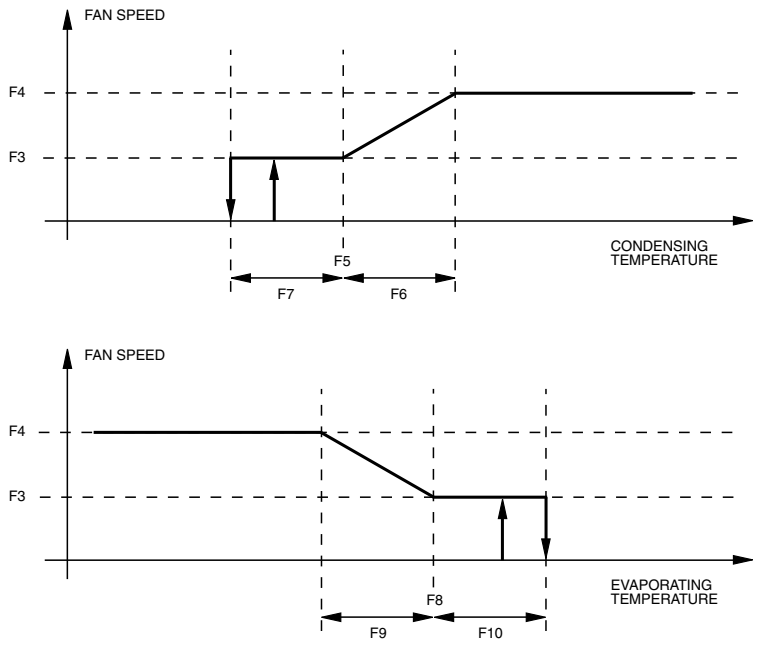
Compressor/pump OFF delays



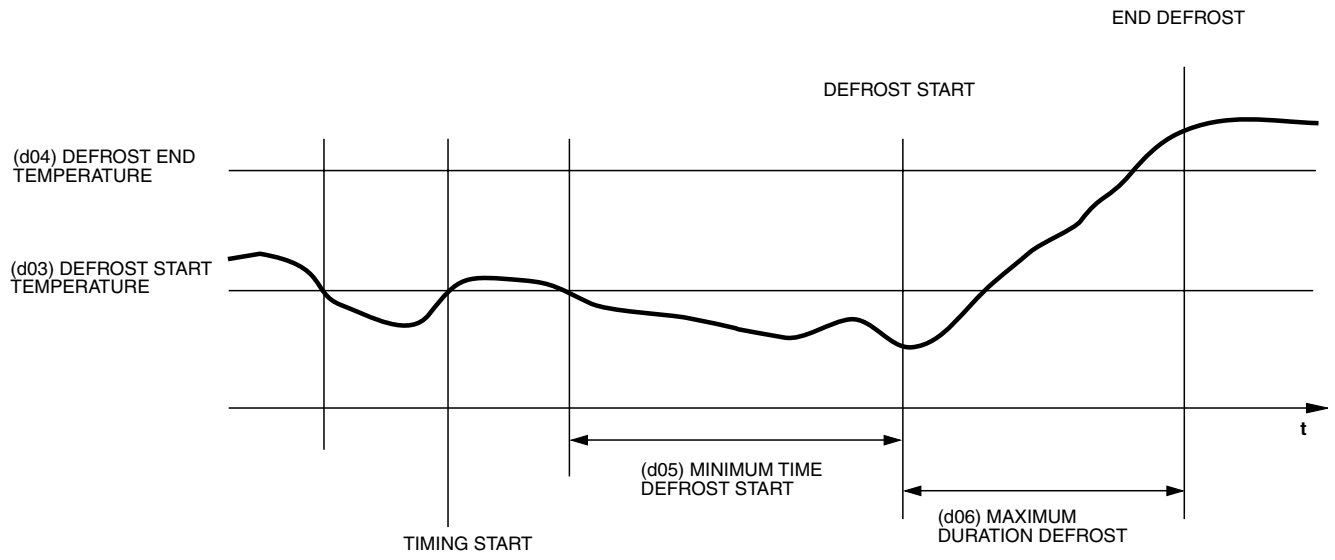
Pump/compressor start-up delays



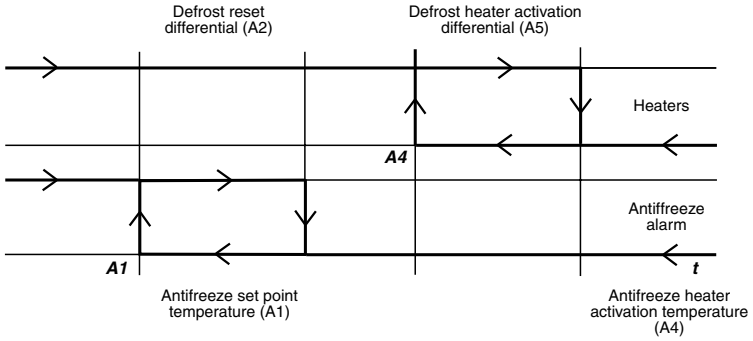
Parameters related to the fans							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
F01	Fan outlet. 0=absent (function not available); 1=present	F	10 (R/W)		1	0	**1**
F02	Operating mode: 0= always ON (function not available) 1= Parallel with compressor (function not available) 2= ON/OFF operation (function not available) 3= Parallel with compressor and speed adjustment.	U	48 (R/W)		3	0	**3**
F03	Minimum triac voltage	F	49 (R/W)	step	F04	0	**50**
F04	Maximum triac voltage	F	50 (R/W)	step	100	F03	**85**
F05	Cool cycle minimum speed pressure	F	24 (R/W)	bar	80	-40	**22.2**
F06	Cool cycle maximum speed temp. differential	F	26 (R/W)	bar	50	0	**3.7**
F07	Cool cycle fan OFF pressure differential	F	28 (R/W)	bar	50	0	**6.5**
F08	Heat cycle minimum speed pressure	F	30 (R/W)	bar	80	-40	**8.7**
F09	Heat cycle maximum speed differential	F	32 (R/W)	bar	50	0	**0.9**
F10	Differential for heat cycle fan	F	34 (R/W)	bar	F08	0	**1.9**
F11	Fan start-up time	F	51 (R/W)	Sec.	120	0	**10**
F12	Triac impulse duration	F	52 (R/W)	Sec.	10	0	**2**
F13	Fan management in defrost mode. 0= Fan deactivated 1= Fan activated in cool cycle mode (function not available) 2= Fan deactivated until end defrost temp. is reached and with start-up at maximum speed during d 16	F	53 (R/W)		2	0	**2**



Parameters related to defrost							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
d01	Execution of defrost 0= no (function not available) 1= yes.	U	7 (R/W)	-	1	0	**1**
d02	Time or temperature defrost. 0= time (function not available). 1= temperature	U	8 (R/W)	-	1	0	**1**
d03	Defrost start pressure	U	19 (R/W)	bar	d04	/11	**5.8**
d04	Defrost end pressure	U	21 (R/W)	bar	/12	d03	**18**
d05	Minimum time for defrost start	U	37 (R/W)	Sec.	150	10	**10**
d06	Minimum defrost duration	U	38 (R/W)	Sec.	150	0	**0**
d07	Maximum defrost duration	U	39 (R/W)	Min.	15	1	**6**
d08	Time between two defrost cycles	U	40 (R/W)	Min.	150	10	**30**
d11	Activation of heaters in defrost 0= no. 1= yes.	U	9 (R/W)	-	0	1	**1**
d12	Compressor OFF before defrost	F	43 (R/W)	Min.	3	0	**1**
d13	Compressor OFF after defrost	F	44 (R/W)	Min.	3	0	**1**
d16	Time of forced vent after defrost (only if F13=2).	F	47 (R/W)	Sec.	360	0	**60**



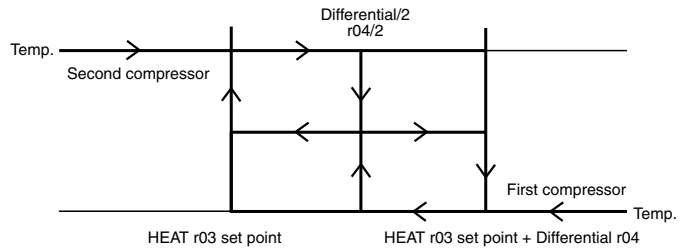
Parameters related to defrost control configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
A01	Antifreeze control set point temperature	U	11 (R/W)	°C	-	A07	**3**
A02	Antifreeze reset differential	U	12 (R/W)	°K	50	0.3	**5**
A03	Antifreeze alarm bypass time	U	22 (R/W)	Sec.	150	0	**0**
A04	Antifreeze heater activation temperature	U	13 (R/W)	°C	r16	A01	**3**
A05	Antifreeze heater activation differential	U	14 (R/W)	°K	50	0.3	**2**
A06	Backup heater control probe 0= control probe 1= antifreeze probe	F	6 (R/W)	-	1	0	**0**
A07	Minimum level antifreeze control set point temperature	U	15 (R/W)	°C	79	-40	**3**
A08	Heating heater activation set point temperature	U	16 (R/W)	°C	r15	A01	**3**
A09	Heating heater deactivation set point temperature differential	U	17 (R/W)	°C	50	0.3	**3**
A10	Automatic start-up by antifreeze alarm (unit in standby) 0= function deactivated 1= Water pump start-up 2= Water pump and compressor start-up in heat cycle (heat pumps only) 3= Heaters in operation	U	23 (R/W)		3	0	**1**



Parameters for unit configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
H01	Unit model. 2= air-water chiller; 3= air-water heat pump.	F	54 (R/W)				**3**
H02	Number of vent circuits (do not modify this parameter)	F	12 (R/W)				**0**
H03	No. of evaporating units present (do not modify this parameter)	F	13 (R/W)				**0**
H04	No. of compressors per circuit (do not modify this parameter)	F	55 (R/W)				**2**
H05	Pump operation 0= absent 1= Always ON 2= ON upon regulator call 3= On under regulator and time call	F	56 (R/W)		3	0	**1**
H06	COOL/HEAT digital intake 0= Absent. 1= Present	U	14 (R/W)		1	0	**0**
H07	ON/OFF digital intake 0= Absent. 1= Present	U	15 (R/W)		1	0	**0**
H08	Network configuration (do not modify this parameter)	F	57 (R/W)		3	0	**2**
H09	Keyboard locked 0= Disabled. 1= Enabled	U	16 (R/W)		1	0	**1**
H10	Serial direction for supervision 0= Future use as terminal	U	58 (R/W)		200	1	**1**
H11	Output configuration (not selectable)	F	59 (R/W)		3	0	**0**
H12	4-way valve logic operation. Activated in cold cycle (do not modify this parameter)	F	60 (R/W)		3	0	**0**
H21	Second pump operation (do not modify this parameter)	F	62 (R/W)		4	0	**0**
H22	Default loading of parameters disabled 1= Disabled. 0= Enabled	F	18 (R/W)		1	0	**1**
H23	Modbus protocol setting 0= Disabled. 1= Enabled	F	11		1	0	**0**

Parameters for alarm configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
P01	Alarm delay by flow switch at start-up.	U	63 (R/W)	Sec.	150	0	**20**
P02	Alarm delay by flow switch with unit in operation.	U	64 (R/W)	Sec.	120	0	**5**
P03	Alarm delay by low pressure switch at start-up.	U	65 (R/W)	Sec.	200	0	**60**
P04	Partialization in HP Prevent high pressure 0= Inactive. 1= Active.	U	66 (R/W)		1	0	**1**
P05	Alarm reset 6= Low and high pressure switch manual reset at third activation in one hour. Antifreeze control is manual reset.	F	67 (R/W)				**6**
P06	Cool and heat cycle symbol. 1= “Sun” heat cycle, “Snow flake” cool cycle. 0= “Sun” cool cycle, “Snow flake” heat cycle.	F	19 (R/W)		1	0	**1**
P08	Digital intake 1 for flow switch. Do not modify this parameter.	F	69 (R/W)				**9**
P09	Digital intake 2 for fan thermal protectors.	F	70 (R/W)				**6**
P10	Digital intake 6 for not in use function.						**0**
P11	Digital intake 7 for flow switch function.	F					**1**
P12	Digital intake 10 for phase control function. Do not modify this parameter.	**F**					**3**
P15	Low pressure alarm selection. 0= Inoperative with compressor OFF. 1= Operative with compressor OFF.	F	76 (R/W)		1	0	**1**
P16	High temperature alarm of return water.	U	38 (R/W)	°C	80	-40	**30**
P17	High temperature delay at start-up.	U	77 (R/W)	Sec.	250	0	**30**
P18	High pressure alarm by transducer 0= Function disabled.	F	39 (R/W)	bar	99.9	0.1	**41**
P19	Low temperature alarm of return water.	U	40 (R/W)	°C	80	-40	**10**
P20	Alarm activation by high and low water temperature at start-up. 1= Function enabled. 0= Function disabled.	U	20 (R/W)		1	0	**0**

Parameters for controller configuration							
Display	**Description**	**Level**	**VS**	**Unit**	**Max.**	**Min.**	**Value**
r01	Cool cycle set point temperature	U	41 (R/W)	°C	r14	r13	**12**
r02	Cool set point temperature differential	U	42 (R/W)	°C	50	0.3	**2**
r03	Heat cycle temperature set point	U	43 (R/W)	°C	r16	r15	**40**
r04	Heat cycle temperature set point differential	U	44 (R/W)	°C	50	0.3	**3**
r05	Compressor rotation 0 = Disabled 1 = FIFO type 2 = By operating hours	F	78 (R/W)		2	0	**2**
r06	Type of adjustment 0= Proportional. Intake temperature. 1= Proportional + neutral zone. Intake temp. 2= Proportional. Output temperature. 3= Proportional + neutral zone. Output temp. 4= By time + dead zone. Output temperature (chillers only).	F	79 (R/W)		4	0	**0**
r07	Neutral zone differential	F	45 (R/W)	°C	50	0	**1**
r08	(If r06=4 only) Maximum activation time. Output temperature.	F	80 (R/W)	Sec.	999	r09	**120**
r09	(If r06=4 only) Minimum activation time. Output temperature.	F	81 (R/W)	Sec.	999	c04	**100**
r10	(If r06=4 only) Maximum deactivation time. Output temperature.	F	82 (R/W)	Sec.	999	r11	**120**
r11	(If r06=4 only) Maximum deactivation time. Output temperature.	F	83 (R/W)	Sec.	999	c05	**100**
r12	(If r06=4 only) Compressor deactivation differential.	F	46 (R/W)	°C	50	0	**1**
r13	Cool cycle minimum set point temperature.	U	47 (R/W)	°C	r14	-40	**6**
r14	Cool cycle maximum set point temperature.	U	48 (R/W)	°C	80	r13	**20**
r15	Heat cycle minimum set point temperature.	U	49 (R/W)	°C	r16	-40	**25**
r16	Heat cycle maximum set point temperature.	U	50 (R/W)	°C	80	r15	**45**



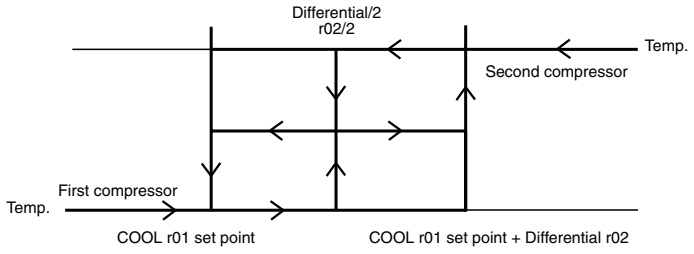


Table of alarms		
Display	**Alarm type**	**Reset**
A1	Antifreeze alarm	Manual
AHt	High temp. at start-up (if activated, P20=1)	Automatic
ALt	Low temp. at start-up (if activated, P20=1)	Automatic
d1-2	Defrost in operation	-
dF1-2	Problem in defrost	Automatic
E1	Probe B1	Automatic
E2	Probe B2	Automatic
E3	Probe B3	Automatic
E4	Probe B4	Automatic
E8	Probe B8	Automatic
ELS	Low supply voltage	Automatic
EHS	High supply voltage	Automatic
EPr	Eprom error. Unit in operation.	Automatic
EPb	Eprom error. At start-up	Automatic
ESP	Communication failure with expansion module	Automatic
EL 1-2	Problem at fan voltage control	Automatic
FL	Flow switch	Manual
Hc1/Hc2	Compressor maintenance alarm	Automatic
HP1/HP2	High pressure	Manual
Ht	High water temperature alarm	Automatic
LP1/LP2	Low pressure	Manual
PC1	Partialization of compressors (high pressure)	Automatic
tC1	Fan thermal protectors	Automatic
TP	Phase order failure/phase failure	Manual

Reset of alarms
Pressing the UP and DOWN keys for 5 seconds cancels alarms present in the memory. At the same time, the alarm message disappears from the display and the alarm relay is deactivated.

Forced defrost (heat pump)
Pressing the SEL and UP keys for 5 seconds activates forced defrost of the unit.

Clearing hour counters
While reading compressor or pump (c10, c11 and c15) operating hours, said counters can be cleared by pressing the UP and DOWN keys simultaneously.

Pump operation
4 operating modes can be selected in accordance with the value given to parameter H5. H5=0 (pump disabled), H5=1 (pump permanently on), H5=2 (pump ON controlled by the regulator or in parallel with the compressor), H5=3 (pump goes on and off at regular intervals, independent of compressor operation) (parameters c17 and c18).

Calibration of probes
If necessary, probes can be calibrated by using parameters /13, /14, /15, /16, /19 and /20. See Parameters related to probes table.

Remote ON/OFF
A remote ON/OFF intake can be connected between terminals D5 and B on the connecting strip. To activate said intake, a value of 1 should be given to parameter H07 (H07= 1). With this intake open the unit is OFF; when closed, the unit is ON. This option does not disable the ON/OFF function of the keyboard.

Remote COOL/HEAT
A remote COOL/HEAT intake can be connected between terminals D1 and B on the connecting strip. To activate said intake, a value of 1 should be given to parameter H06 (H06= 1). With this intake open the unit is in HEAT; when closed, the unit is in COOL.
This function disables the HEAT/COOL function of the keyboard.

Partialization of compressors in (HP Prevent) high pressure
This function is activated if P04 = 1. If for any reason the high pressure is near the disconnecting point (P18-0.5 bar), this control deactivates one of the compressors and waits 10 seconds.
After this interval, if the alarm persists, the unit is turned off. If, on the other hand, the alarm disappears, the unit will continue to operate with one single compressor. In this situation, the message PC1 appears on screen. This condition will remain activated until the pressure drops below the F5 + F6 value.
In this case, the unit recovers the previously deactivated compressor.

Operating Instructions

µC3 Control, YLCA/YLHA 100, 120 and 150

This is a specially programmed controller for air-water chillers and heat pumps with four capacity stages. These are divided into two independent cooling circuits equipped with two tandems that act upon a common water circuit. Both systems are equipped with two fans each, the speed of which is controlled by pressure sensors. This control operates through the following intakes and outlets.

Digital inputs

ID1 - J1/8	General protection (PG)
ID2 - J1/1	Flow switch (FS)
ID3 - J1/9	Remote ON/OFF (ROO)
ID4 - J1/2	ID5 -J1/10
ID5 - J1/10	Low pressure switch circuit 1 (LP1)
ID6 - J4/8	High pressure switch circuit 1 (HP1)
ID7 - J4/1	Thermal protector compressor 1 (THPC1)
ID8 - J4/9	Thermal protector compressor 2 (THPC2)
ID9 - J4/2	Thermal protector circuit 1 fans (THPF 1-2)
ID10 - J4/10	Low pressure switch circuit 2 (LP2)
ID11 - J7/6	High pressure switch circuit 2 (HP2)
ID12 - J7/1	Thermal protector compressor 3 (THPC3)
ID13 - J7/8	Thermal protector compressor 4 (THPC 4)
ID14 - J7/3	Thermal protector circuit 2 fans (THPF 3-4)
ID15 - J7/9	Remote COOL/HEAT (RCH)
ID18 - J7/5	Pump 2 protector (Q6)

Digital outputs

N01/C1-2	Compressor 1 circuit 1 (K1)
N02/C1-2	Compressor 2 circuit 1 (K2)
N05/C5	Pump 1
N06/C6-7	Compressor 3 circuit 2 (K3)
N07/C6-7	Compressor 4 circuit 2 (K4)
N08/C8-9	Pump 2
N010/C10	Alarm
N011/C11-12	Antifreeze heater circuit 1-2
N012/C11-12	Backup heater
N013/C13-14	4-way valve circuit 1 (V4V1)
N014/C13-14	4-way valve circuit 2 (V4V2)

Analogical inputs

B3 - J2	Coil pressure, circuit 1
B4 - J3	Coil pressure, circuit 2
B5 - J4/13	Water temperature at exchanger intake
B6 - J4/12	Water temperature at exchanger outlet

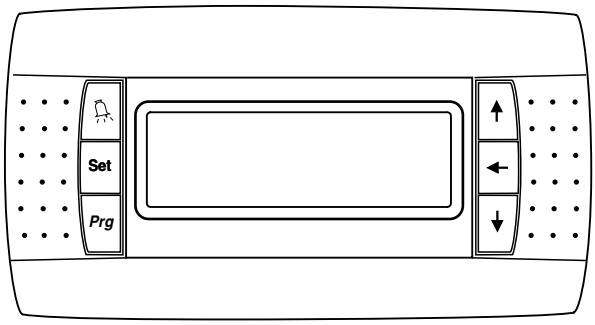
Analogical outputs

Y3	Fan speed control, circuit 1 (PWM)
Y4	Fan speed control, circuit 2 (PWM)

The system is made up of the following basic components:
- *Keyboard-display*
- *µC3 controller*
- *Fan speed controllers (FSC1 and FSC2)*
- *Pressure sensors (B3 and B4)*
- *NTC probes (B5 and B6)*

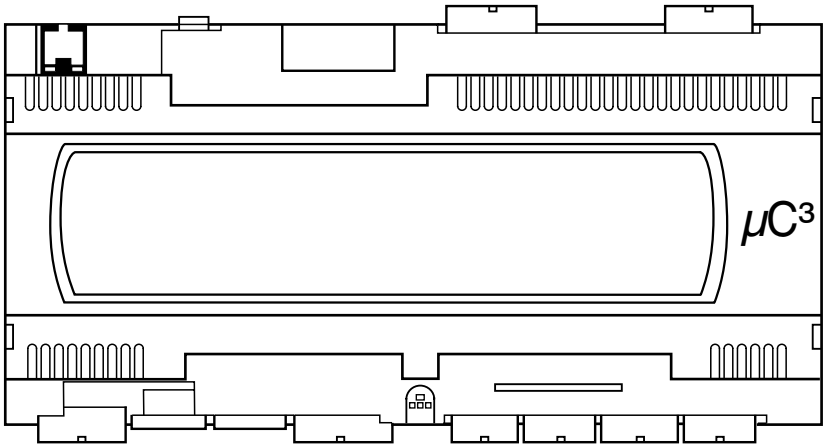
Keyboard-display

Has a display screen and six keys with the following functions: *Alarm, Prg (Programming, Esc (Escape), Up, Enter and Down*. On this screen we can select the ON/OFF and COOL/HEAT functions, read out the unit status, access the configuration menus (by means of a *password*), read out the alarm messages, reset said alarms, read out operating pressures and temperatures, etc.

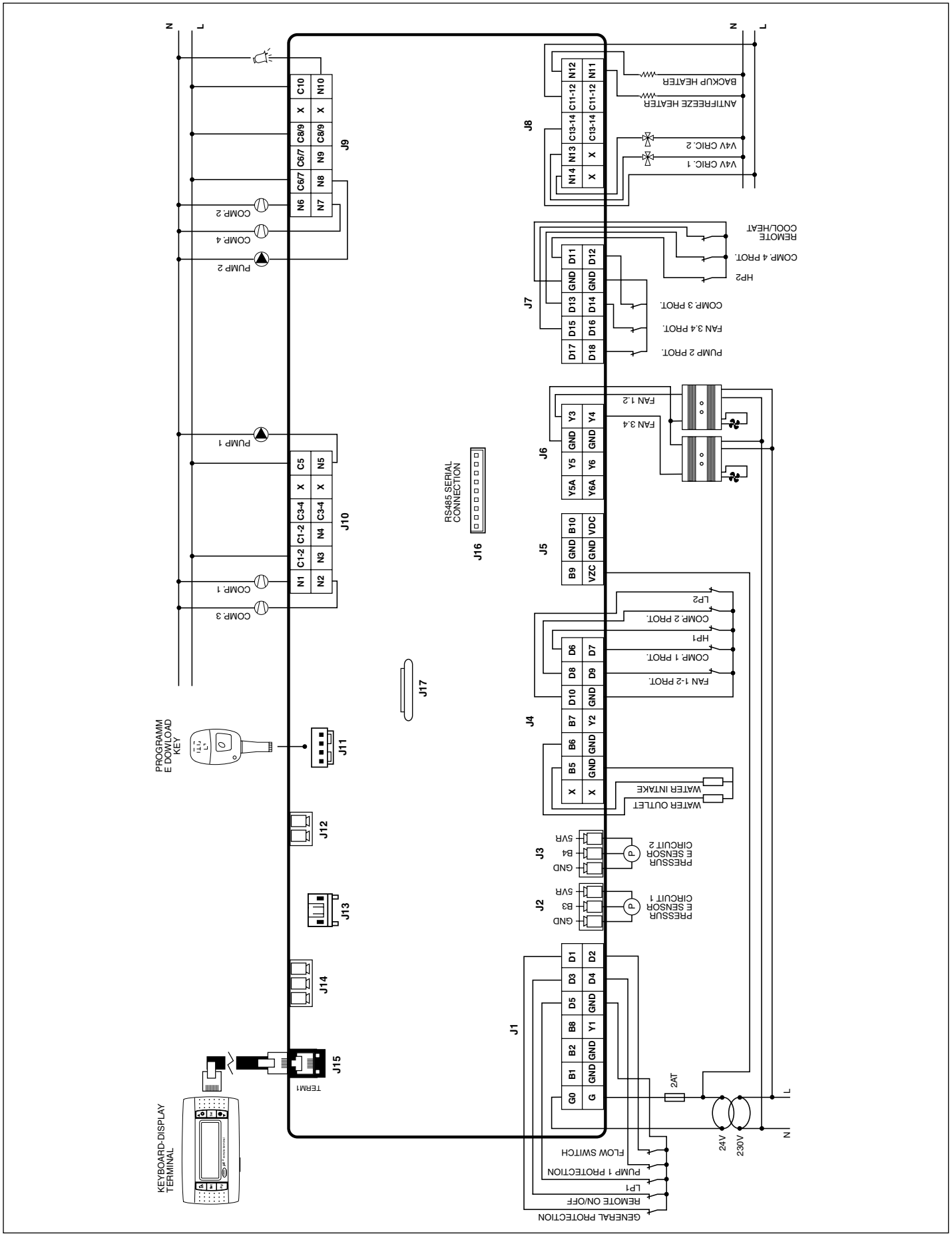


µC3 controller

It contains the unit *software* and the entire digital and analogue input and output connectors. This module is also equipped with connectors the program download key and the serial communication connection to an RS485 monitoring system.



General diagram



Pressure sensors (B3 and B4)

One for each cooling circuit and connected to the coil collectors. Provide information to the system for fan speed adjustment in the summer and winter cycles, management of defrosts in the heat pumps, *prevent and lockout* functions of the system by excessively high pressure.

NTC probes (B5 and B6)

B5- For the detection and control of water intake temperature (cool only and heat pump units).
B6- For the detection of water outlet temperature. Provides information for antifreeze protection and control of the antifreeze and backup heaters. If required, allows controlling water temperature at the heat exchanger discharge.

Start-up

About 45 seconds after powering the unit, the start-up display is activated. Default language: English.

1st display. Start-up (*information on water temperature/unit status*)
- Water intake temperature.
- Water outlet temperature.
- Unit status (*On/Off*).

Press *"down"* to access the second display.

2nd display. Selection of status and operating mode
Selection of the On/Off mode (with *"Enter", "Up" and "Down"*)
On the heat pump units, select the Cool/Heat function (with *"Enter", "Up" and "Down"*).
To return to the 1st display, press *"Esc"*.

System configuration (*for authorized servicing personnel only*)

3rd display. Insert the password
The 3rd display, *"Insert password"* is accessed by pressing *"Up"* from the 1st display (Start-up), or *"Down"* from the 2nd display (selection of operating status/mode)

- From *"Insert password"* display, press *"Enter"*.
- Enter the *Password* with the *"Up"* key.
- Press *"Enter"* to access the 4th *"Menu"* display.

4th display. Menu
From this display we can access a set of submenus that provide information on the unit or allow configuring the operating parameters of same. Said submenus are as follows:

-/- Probes *(Probes config.)*
-A- Antifreeze
-B- Input/output
-c- Compressors *(Comps. conf.)*
-d- Defrost
-F- Condensation *(fans)*
-H- Unit configuration
-P- Alarm settings
-r- Temperature control *(control param.)*
-Fr- Software version/language selection
-t- Time configuration *(not available)*

To enter a submenu, select same with the *"Up" or "Down"* keys, and then activate it with the *"Enter"* key.
Once the parameters are set with the *"Enter", "Up"* and *"Down"* keys, press *"Prg"* to confirm the modification and return to the *"Menu"* display. To exit the *"Menu"* display, press the *"Esc"* key.

-/- Probes configuration

DESCRIPTION		RANGE	UNIT	VALUE
Probe B3 calibration	Coil pressure circuit 1	-9.9 / 9.9	bar	0
Probe B4 calibration	Coil pressure circuit 2	-9.9 / 9.9	bar	0
Probe B5 calibration	Intake water temp. to exchanger	-9.9 / 9.9	°K	0
Probe B6 calibration	Outlet water temp. from exchanger	-9.9 / 9.9	°K	0
Probe B7 calibration	Outdoor temperature	-9.9 / 9.9	°K	0
Probe B8 calibration	Dynamic set point	-9.9 / 9.9	%	0
Enabling probe B1		YES/NO	-	NO
Enabling probe B2		YES/NO	-	NO
Enabling probe B3	Coil pressure circuit 1	YES/NO	-	YES
Enabling probe B4	Coil pressure circuit 2	YES/NO	-	YES
Enabling probe B5	Intake water temp. to exchanger	YES/NO	-	YES
Enabling probe B6	Outlet water temp. from exchanger	YES/NO	-	YES
Enabling probe B7		YES/NO	-	NO
Enabling probe B8		YES/NO	-	NO
Enabling probe B9		YES/NO	-	NO
Enabling probe B10		YES/NO	-	NO
Probe B3 configuration	Minimum value	-30/150	bar	0
Probe B3 configuration	Maximum value	-30/150	bar	45
Probe B4 configuration	Minimum value	-30/150	bar	0
Probe B4 configuration	Maximum value	-30/150	bar	45

-A- Antifreeze

DESCRIPTION	RANGE	UNIT	VALUE
Min. operating time of a compressor	-99.9/99.9	°C	3
Antifreeze alarm set point differential	99.9	°K	5
Antifreeze alarm set point lower limit	-99.9/99.9	°C	3
Antifreeze alarm set point upper limit	-99.9/99.9	°C	5
Antifreeze alarm reset	MANUAL AUTOMATIC	-	MANUAL
Antifreeze alarm delay (if automatic reset has been selected)	0/540	min.	0
Antifreeze heater activation set point	-99.9/99.9	°C	3
Antifreeze heater activation set point differential	-99.9/99.9	°K	2
Backup heater set point (winter cycle)	-99.9/99.9	°C	25
Backup heater set point differential (winter cycle)	-99.9/99.9	°K	5
Backup heater activation delay	0/60	min.	15
Antifreeze system automatic activation with the unit OFF	DISABLED HEATER AND PUMP HEATER AND UNIT HEATER	-	HEATER

-C- Compressors configuration

DESCRIPTION	RANGE	UNIT	VALUE
Min. operating time of a compressor	0/9999	Sec.	120
Min. off time of a compressor	0/9999	Sec.	60
Start-up time between different compressors	0/9999	Sec.	3
Start-up time of one single compressor	0/9999	Sec.	300
Start-up time between pump and compressor	0/999	Sec.	20
Off time between compressor and pump	0/999	Sec.	20
Pump 1 operating hours			
Pump 2 operating hours			
Compressor 1 operating hours			
Compressor 2 operating hours			
Compressor 4 operating hours			
Compressor 4 operating hours			
Operating hours for pump maintenance alarm	1000/999000	hours	2x1000
Operating hours for compressor 1/circuit 1 maintenance alarm	1000/999000	hours	2x1000
Operating hours for compressor 2/circuit 1 maintenance alarm	1000/999000	hours	2x1000
Operating hours for compressor 1/circuit 2 maintenance alarm	1000/999000	hours	2x1000
Operating hours for compressor 2/circuit 2 maintenance alarm	1000/999000	hours	2x1000
Tandem compressor rotation time		min.	20
Enabling of compressors C1/C2/, C1/ C2	YES/NO		YES
Manual operation forced by the compressors	YES/NO		NO

-d- Defrost

When a defrost cycle is being carried out, the message DEFROST REQ appears on the start-up display.

DESCRIPTION	RANGE	UNIT	VALUE
Defrost probe selection	PRESSURE TEMP. PRESSURE SWITCH	-	PRESSURE
Separate or simultaneous defrost (contemporaneous)	SEPARATE SIMULTANEOUS	-	SIMULTANEOUS
End defrost by interval of	TIME TEMP./PRESSURE	-	TEMP./PRESSURE
Defrost start pressure	-99.8/99.9	bar	5.8
Defrost end pressure	-99.8/99.9	bar	26
Defrost call delay	1/32000	Sec.	1800
Max. defrost time	1/32000	Sec.	420
Min. defrost time	1/32000	Sec.	0
Timing between defrosts of on single circuit	1/32000	Sec.	0
Timing between defrosts of different circuits	1/32000	Sec.	0
Compressor forced off time at start and end of defrost	0/999	Sec.	40
4-way valve inversion delay	0/999	Sec.	15
Manual defrost	ENABLED DISABLED	-	DISABLED

-F- Condensation (fans)

DESCRIPTION	RANGE	UNIT	VALUE
Type of fan control	PRESSURE TEMPE-RATURE ON/OFF	-	PRESSURE
No. of condensers	1 - 2	-	2
Control device	FANS INVERTER	-	INVERTER
Power supply frequency	50/60	Hz	50
PMW max. triac cut-off	0/100	%	85
PWM min. triac cut-off	0/100	%	50
Triac impulse duration	0/10	ms	2.5
Condensing pressure in summer cycle	0/99.9	bar	26
Condensing pressure differential in summer cycle	0/99.9	bar	7
Evaporating pressure in summer cycle	0/99.9	bar	8.7
Evaporating pressure differential in winter cycle	0/99.9	bar	0.9
Min. fan speed differential	-99.9/99.9	bar	5
Max. inverter speed	0/10	V	10
Min. inverter speed	0/10	V	0
Inverter speed up time	0/999	Sec.	0
Prevent function activation (HP)	YES/NO	-	YES
Selection of probe for HP prevention	PRESSURE TEMPERATURE	-	PRESSURE
Prevention pressure HP	-99.9/99.9	bar	40
Prevention pressure HP differential	0/99.9	bar	5
LP prevention pressure	-99.9/99.9	bar	2
LP prevention pressure differential	0/99.9	bar	2
Fan management in the case of probe failure	FAN OFF FAN ON & COMP. ON		FAN OFF
Prevent function timing	0/99	Sec.	0

-H- Unit configuration

DESCRIPTION	RANGE	UNIT	VALUE
Unit type	0 - 7	-	2 (COOLER) 3 (HEAT PUMP)
No. of compressors/circuits		-	4 / 2
Compressor rotation	LIFO FIFO PERSONALIZED TIME	-	FIFO
No. of evaporators	1 - 2	-	1
Driver number (EVD400)	0-1-2-4	-	0
Cycle inversion valve logic	NO/NC	-	NC
No. of pumps	1 - 2	-	1 (SINGLE PUMP) 2 (TWO-PUMP ACCESSORY)
Pump rotation	START-UP TIME	-	TIME
Pump operation	ON WITH COMP. ON ALWAYS OFF ALWAYS ON SAFETY ON/OFF		ALWAYS ON
No. of hours for pump rotation	0-9999	hours	12
ON/OFF digital input activation	YES/NO	-	NO
WINTER/SUMMER digital input activation	YES/NO	-	NO
ON/OFF activation with monitor	YES/NO	-	NO
WINTER/SUMMER activation with monitor	YES/NO	-	NO
SUMMER/WINTER operation inversion delay		Sec.	10
Monitoring protocol	CAREL GSM MODEM RS232 LONWORKS MODBUS	-	CAREL
Selection of communication speed	1200; 2400; 4800; 9600; 19200	bauds	19200
Monitoring ID number	0-200	-	1
Selection of language at start-up	YES/NO	-	YES
Restore values by default (Attention!)	YES/NO	-	NO

-B- Inputs/Outputs

DESCRIPTION	RANGE	UNIT	VALUE
Analogue input 3. Coil pressure circuit 1 (B3)		bar	INSTANT READ OUT
Analogue input 4. Coil pressure circuit 2 (B4)		bar	INSTANT READ OUT
Analogue input 5. Intake water temperature (B5)		°C	INSTANT READ OUT
Analogue input 6. Outlet water temperature (B6)		°C	0 = OPEN C = CLOSED
Digital input 1. External alarm	O/C		0 = OPEN C = CLOSED
Digital input 2. Flow switch	O/C		0 = OPEN C = CLOSED
Digital input 3. Remote ON/OFF	O/C		0 = OPEN C = CLOSED
Digital input 4. Pump 1 protector	O/C		0 = OPEN C = CLOSED
Digital input 5. Low pressure switch circuit 1	O/C		0 = OPEN C = CLOSED
Digital input 6. High pressure switch circuit 1	O/C		0 = OPEN C = CLOSED
Digital input 7. Thermal protector compressor 1 circuit 1	O/C		0 = OPEN C = CLOSED
Digital input 8. Thermal protector compressor 2 circuit 1	O/C		0 = OPEN C = CLOSED
Digital input 9. Fan 1-2 protectors circuit 1	O/C		0 = OPEN C = CLOSED
Digital input 10. Low pressure switch circuit 2	O/C		0 = OPEN C = CLOSED
Digital input 11. High pressure switch circuit 2	O/C		0 = OPEN C = CLOSED
Digital input 12. Thermal protector compressor 3 circuit 2	O/C		0 = OPEN C = CLOSED
Digital input 13. Thermal protector compressor 4 circuit 2	O/C		0 = OPEN C = CLOSED
Digital input 14. Fan 3-4 protector circuit 2	O/C		0 = OPEN C = CLOSED
Digital input 15. Remote COOL/HEAT	O/C		0 = OPEN C = CLOSED
Digital input 16. Not used			
Digital input 17. Not used			
Digital input 18. Pump 2 protector			0 = OPEN C = CLOSED
Digital output 1. Compressor 1 circuit 1	O/C		0 = OPEN C = CLOSED
Digital output 2. Compressor 2 circuit 1	O/C		0 = OPEN C = CLOSED
Digital output 3. (Not used)			
Digital output 4. (Not used)			
Digital output 5. Pump 1	O/C		0 = OPEN C = CLOSED
Digital output 6. Compressor 3 circuit 2	O/C		0 = OPEN C = CLOSED
Digital output 7. Compressor 4 circuit 2	O/C		0 = OPEN C = CLOSED
Digital output 8. (Not used)			
Digital output 9. (Not used)			
Digital output 10. External alarm / fuse failure	O/C		0 = OPEN C = CLOSED
Digital output 11. Antifreeze heater	O/C		0 = OPEN C = CLOSED
Digital output 12. Backup heater	O/C		0 = OPEN C = CLOSED
Digital output 13. 4-way valve circuit 1	O/C		0 = OPEN C = CLOSED
Digital output 14. 4-way valve circuit 2	O/C		0 = OPEN C = CLOSED

-P- Alarms

DESCRIPTION	RANGE	UNIT	VALUE
High pressure alarm set point (B3; B4 transducer)	0/99.9	bar	41
High pressure alarm differential (B3; B4 transducer)	0/99.9	bar	10
Summer low pressure alarm	0/99.9	bar	3
Winter low pressure alarm	0/99.9	bar	2
Defrost low pressure alarm	0/99.9	bar	1
Low pressure differential	0/99.9	bar	1
Low pressure alarm delay at cool cycle start-up	0-999	s	60
Low pressure alarm delay at heat and defrost cycle start-up	0-999	s	0
Water flow switch alarm delay at start-up	0-999	s	20
Water flow switch alarm delay in operation	0-999	s	5
Number of off cycles per automatic reset alarms	0 - 4		1
Max. period for automatic reset alarms	0 - 99	m	60
Selection of automatic reset alarm: compressor thermal	AUTOMATIC/MANUAL		AUTOMATIC
Selection of automatic reset alarm: fan thermal	AUTOMATIC/MANUAL		AUTOMATIC
Selection of automatic reset alarm: low pressure switch	AUTOMATIC/MANUAL		AUTOMATIC
Selection of automatic reset alarm: high pressure switch	AUTOMATIC/MANUAL		AUTOMATIC

-r- Control

When this submenu is activated, the dynamic set point temperature appears (if this function is enabled). Press "Down" to access the configuration menu.

DESCRIPTION	RANGE	UNIT	VALUE
Set point in COOL		°C	12
Set point in HEAT		°C	40
Temperature control adjustment range		°K	3
COOL *set point* lower limit		°C	6
COOL *set point* upper limit		°C	20
HEAT *set point* lower limit		°C	25
HEAT *set point* upper limit		°C	45
Temp. setting type	INPUT/OUTPUT	-	INPUT
Setting type with input probe	PROPORTIONAL / P + 1		PROPORTIONAL
Integration time in each adjustment P + 1	0/9999	s	600
Max. increase time of call (output adjustment)	0/9999	s	20
Min. increase time of call (output adjustment)	0/9999	s	20
Max. decrease time of call (output adjustment)	0/9999	s	10
Min. decrease time of call (output adjustment)	0/9999	s	10
Temp. differential in which increase and decrease times vary (output adjustment)	-99.9/99.9	°C	2
Forced off in COOL cycle (output adjustment)	-99.9/99.9	°C	5
Forced off in HEAT cycle (output adjustment	-99.9/99.9	°C	47

F-r. Software version/language selection
- Read out of the µC3 software version and update date.
- The *"Up", "Down" and "Enter"* keys select the language: English or Italian.

Temperature control
Two different modes ("Menu Control"):

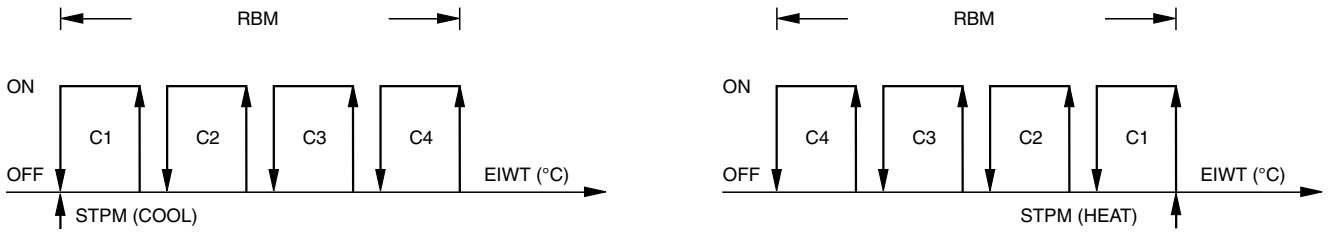
1. Adjustment by water temperature at the heat exchanger **intake** (probe B5).
   This control carries out a proportional type adjustment based on a set point and a proportional band distributed over 4 stages. This is the controller default type.
   It is also possible to carry out a proportional and integral adjustment. In this case, said function must be enabled and the integration time set (*"Control Menu"*).

Control sensor: B5 (intake water temperature to heat exchanger)

Parameters to be used:
- Set point.
- Proportional band for intake adjustment.
- Type of adjustment (Proportional or Proportional + Integral)
- Integration time (if the Proportional + Integral adjustment has been enabled).

Control outputs: N1, N2, N6 and N7 (compressor contactors),

Description of operation:
Temperature control depends upon the value measured by the probe located at the water intake to the heat exchanger. It follows a proportional logic in which the proportional band is subdivided into four equal stages that give way to on/off functions of the compressors. In Proportional + Integral operation behaviour is similar, but affected by al algorithm that takes time into account (*integration time parameter*).

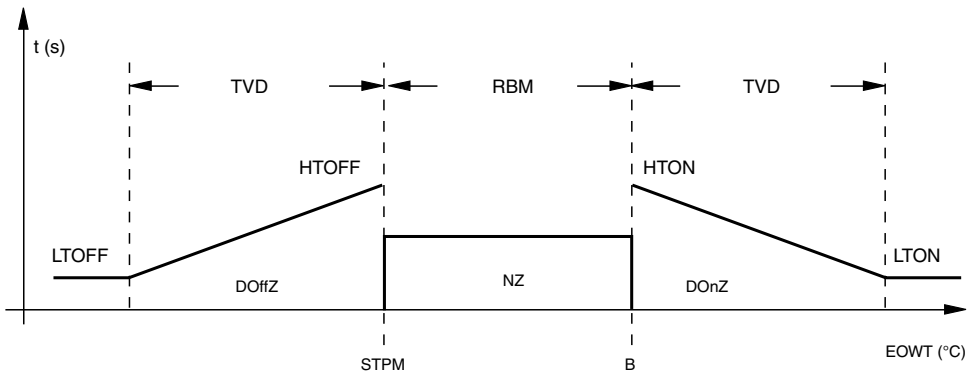


STPM Set point
RBM Control band
EIWT Intake water temperature to heat exchanger
C1, 2, 3, 4 Stages/compressors

2. Adjustment by water temperature at the **outlet** of the heat exchanger.

Thermostatic control is based on the temperature value detected by probe B6.
Based on the set point value (STPM) and the control base (RBM), it defines a neutral temperature zone (NZ).
- The temperature values comprised between the set point and the set point plus the band (STPM ≤ Temperature ≤ STPM + RBM) do not cause the on/off function of the compressors.
- Temperature values above the set point plus the band (Temperature > STPM + RBM) cause compressor operation.
- Temperature values below the set point (Temperature < STPM) turn the compressors off.

The on/off process of the compressors is controlled by a variable delay time.
Based on the time differential calculated as the delay, and in accordance with the temperature detected by probe B6, this control will modulate the on/off process of the compressors.
If set to 0, minimum delay time at increase/decrease of the power demand, this function is disabled.
There is a different temperature differential for the cool/heat cycles (below or above...), as of which there is an unconditional off of the devices installed to avoid excessive cool/heat cycles.



STPM	*Set point*
RBM	*Control band*
NZ	*Neutral zone*
EOWT	*Water temperature at exchanger outlet*
DonZ	*Compressor ON zone*
DoftZ	*Compressor OFF zone*
TVD	*Differential of phase input/output time variations*
HTON	*Stage activation maximum time delay*
LTON	*Stage activation minimum time delay*
HT OFF	*Stage deactivation maximum time delay*
LT OFF	*Stage deactivation minimum time delay*
t	*Time*

Rotation of compressors
The controller provides a FIFO type rotation in which the first compressor to go on will be the first to go off as well.
Start-up sequence: C1, C2, C3, C4.
Off sequence: C1, C2, C3, C4.

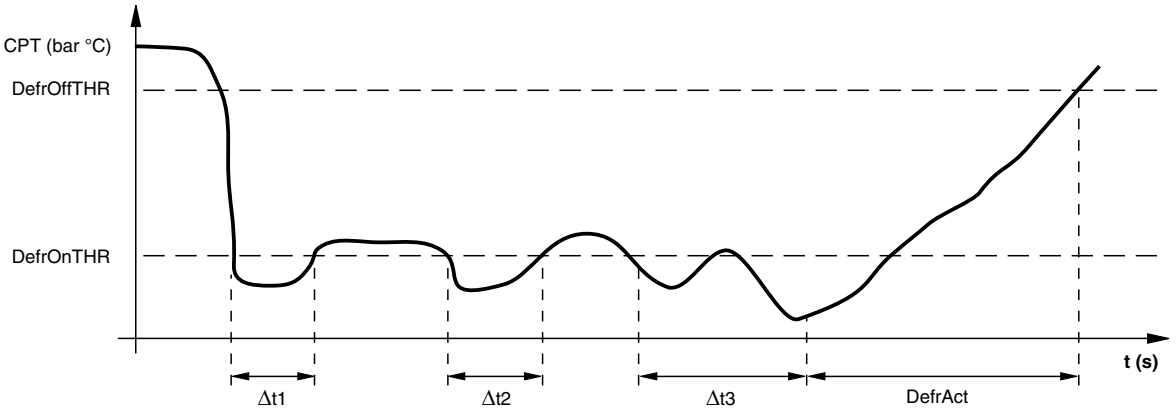
HP prevent
When this function is enabled, the controller attempts to avoid the blockage of the unit due to excessively high pressure. When said pressure reaches a preestablished value near the off pressure, the controller speeds up the fans to a maximum (if in cool cycle), or slows them down to a minimum (if in heat cycle). If the operating pressure continues getting close to the *HP Prevent* pressure, the controller turns off a compressor in the tandem of the affected circuit. The parameters of said function are accessed from the *"Condensation"* menu.

Defrost cycle
If the evaporating pressure of one of the systems remains below the value set for starting defrost during an accumulated period of time equal to the period established as the delay between defrosts, simultaneous defrost of all unit coils is started. The cycle ends once the pressure set as end defrost is reached, or at the end of the time period set as maximum duration of the cycle.
The defrost sequence is as follows: 1. Compressors are turned off. 2. After 15 seconds, the 4-way valves are inverted. 3. After 45 seconds, the compressors go on with the fans off. 4. Once the defrost is over, the compressors go off. 5. After 15 seconds, the 4-way valves are inverted. 6. After 45 seconds, the compressors and fans start up again.

Control sensors: Pressure transducers B3 and B4.

Parameters used:
- Simultaneous defrost.
- Defrost start pressure.
- Defrost end pressure.
- Defrost call delay.
- Maximum defrost duration.
- Minimum defrost duration.
- Compressor forced off time by cycle inversion.
- 4-way valve inversion delay.

Affected outputs:
- Compressors (N1, N2, N3 and N4).
- 4-way valves (N13 and N14).
- Fans (Y3 and Y4).



DefrOff	End defrost pressure
DefrOn	Start defrost pressure
Δt 1...3	Partial times of remaining in defrost start pressure zone
DefrAct	Defrost active
t	Time

Antifreeze protection
If the B6 temperature sensor (water outlet) detects a temperature below the antifreeze set temperature, the unit is blocked and in a state of alarm (manual reset). Simultaneously, the protecting heaters of the plate heat exchanger (output N11) are connected. If the unit includes a hydro kit, the accumulator tank protection heaters will also be activated.
Said heaters will turn off when the D6 sensor detects a temperature equal to the antifreeze temperature, plus a preestablished differential.
The antifreeze system will operate despite the status and mode of the unit.
Antifreeze protection can also include start-up of the pump and unit (see parameters in the *"Antifreeze"* menu).

Backup heater
If following a preestablished time period after unit start-up in heat mode the water outlet temperature detected by B6 does not reach the minimum value, backup heater output (N12) is activated. Once the water temperature has reached said value, plus a preestablished differential, said output will be deactivated (see parameters in the *"Antifreeze"* menu).

Remote ON/OFF
A digital ON/OFF remote input can be installed between terminals ID3-G0, and enabled with the corresponding parameters of menu *"H - unit config.".*
If the contact is open, the unit will remain OFF. If said contact is closed, the unit will be ON.
If the unit is OFF due to said digital input, a message appears on the display indicating same.
The unit will remain OFF whenever any of its inputs -user keyboard, digital or monitoring input- are in OFF.

Remote COOL/HEAT
A digital COOL/HEAT remote input can be installed between terminals ID15-G0, and enabled with the corresponding parameters of menu *"H "*.
If the contact is open, the unit will remain HEAT. If said contact is closed, the unit will be in COOL.
If the digital COOL/HEAT input is enabled, said selection cannot be made from the user or monitoring keyboard.
To change the cycle, either from the digital input, the user keyboard or the monitoring keyboard, the unit must be OFF.
If the COOL/HEAT digital input has not been enabled, said function can be carried out indifferently from the user or monitoring keyboards.

Second pump
A second pump can be enabled by means of the *"H-unit config."* menu. To do this, install the connector (pump 230-150) between terminals N8-N, and the corresponding protector (contact NC) between terminals DI18-G0.
This second pump will be in operation alternatively with the first pump, taking into account the number of operating hours or start-up cycles. In the case of a protector failure of one of the two pumps, the available pump will activate immediately.

Download key
The central µC3 module has a connector (J11) for connection of a download key (PSOPZKEYAO) with the unit operational program.

Serial connection for monitoring
Controller µC3 allows connecting to a monitoring system using an RS485 serial plate. By means of menu *"H-unit config."* it is possible to configure and enable this function. The system has two monitoring protocols: Carel and Modbus.

AUTO-RESTART
When the unit is turned off by a power shortage, and once same is restored, the unit retains the same operating mode and status that was present before the shortage.

Alarm system
When an alarm is generated, the red key on the left upper corner of the user keyboard-display goes on.
Pressing this key, the cause of the alarm appears on the display. Then, press the *"Up" or "Down"* keys to check for further causes of the failure, which will appear on the display successively.
When the alarms are of automatic reset, unit operation is restored once the causes of the alarm have disappeared. If the failure is of manual reset, and once the cause of same has disappeared, the *"Alarm"* key must be pressed to restore unit operation. Then press the *"Esc"* key to return to the initial display.

Table of alarms

DESCRIPTION	INPUT	OFF CIRC.1	OFF CIRC.2	OFF FAN	OFF PUMP	OFF SYS.	RESET	DELAY	NOTES
Serious alarm FC, PG	ID1	X	X	X	X	X	MANUAL	-	General protection phase control
Antifreeze alarm	B6	X	X	X	-	X	MANUAL	-	In OFF mode, possibility of having pump on. See "Antifreeze" menu.
Thermal protector pump 1 Q5	ID4	X	X	X	X	X	MANUAL	-	If available, pump 1 starts. If not, the system turns off.
Thermal protector pump 2 Q6	ID18	X	X	X	X	X	MANUAL	-	If available, pump 1 starts. If not, the system turns off.
Water flow switch PDW, FS	ID2	X	X	X	X	X	MANUAL	Selectable	Delays in start-up and on operations.
Fan thermal protector circ. 1 THPF1, THPF2	ID9	X	-	Circ. 1	-	-	AUTO/ MANUAL	1st failure in 60' intervals, **automatic reset**	2nd failure in 60' intervals, **manual reset**
Fan thermal protector circ. 2 THPF3, THPF4	ID14	-	X	Circ. 2	-	-	AUTO/ MANUAL	1st failure in 60' intervals, **automatic reset**	2nd failure in 60' intervals, **manual reset**
Compressor 1 thermal protector A1 (YCSA/LCA 150, YCSA-H/BRAW 150)	ID7	Comp. 1	-	-	-	-	AUTO/ MANUAL	1st failure in 60' intervals, **automatic reset**	2nd failure in 60' intervals, **manual reset**
Compressor 2 thermal protector A2 (YCSA/LCA 150, YCSA-H/BRAW 150)	ID8	Comp. 2	-	-	-	-	AUTO/ MANUAL	1st failure in 60' intervals, **automatic reset**	2nd failure in 60' intervals, **manual reset**
Compressor 3 thermal protector A3 (YCSA/ LCA 150, YCSA-H/ BRAW 150)	ID12	-	Comp. 3	-	-	-	AUTO/ MANUAL	1st failure in 60' intervals, **automatic reset**	2nd failure in 60' intervals, **manual reset**
Compressor 4 thermal protector A4 (YCSA/LCA 150, YCSA-H/BRAW 150)	ID13	-	Comp. 4	-	-	-	AUTO/ MANUAL	1st failure in 60' intervals, **automatic reset**	2nd failure in 60' intervals, **manual reset**
High pressure switch circ. 1 HP1	ID6	X	-	Circ. 1	-	-	AUTO/ MANUAL		**Manual Reset**
High pressure switch circ. 2 HP2	ID11	-	X	Circ. 2	-	-	AUTO/ MANUAL		**Manual Reset**
High pressure switch circ. 1 LP1	ID5	X	-	Circ. 1	-	-	AUTO/ MANUAL		**Manual Reset**
High pressure switch circ. 2 LP2	ID10	-	X	Circ. 2	-	-	AUTO/ MANUAL		**Manual Reset**
High pressure switch circ. 1 by transducer	B3	X	-	Circ. 1	-	-	MANUAL		**Manual Reset**
High pressure switch circ. 2 by transducer	B4	-	X	Circ. 2	-	-	MANUAL		**Manual Reset**
Probe B3 failure	B3						MANUAL	60'	
Probe B4 failure	B4						MANUAL	60'	
Probe B5 failure	B5	X	X	X	X	X	MANUAL	60'	
Probe B6 failure	B6	X	X	X	X	X	MANUAL	60'	
Probe B7 failure	B7						MANUAL	60'	
Probe B8 failure	B8						MANUAL	60'	
Pump 1 maintenance	System						MANUAL		Set time period in *"Compressors"* menu
Pump 1 maintenance	System						MANUAL		Set time period in *"Compressors"* menu
Compressor 1 maintenance	System						MANUAL		Set time period in *"Compressors"* menu
Compressor 2 maintenance	System						MANUAL		Set time period in *"Compressors"* menu
Compressor 3 maintenance	System						MANUAL		Set time period in *"Compressors"* menu
Compressor 4 maintenance	System						MANUAL		Set time period in *"Compressors"* menu

Temperature/heater characteristics of NTC control probes (10 kOhms)

Temperature (°C)	Heater (kOhms)
-50	329.20
-49	310.70
-48	293.30
-47	277.00
-46	261.80
-45	247.50
-44	234.10
-43	221.80
-42	209.80
-41	198.70
-40	188.40
-39	178.30
-38	168.90
-37	160.10
-36	151.80
-35	144.00
-34	136.60
-33	129.70
-32	123.20
-31	117.10
-30	111.30
-29	106.70
-28	100.40
-27	95.47
-26	90.80
-25	86.39
-24	82.22
-23	78.29
-22	74.58
-21	71.07
-20	67.74
-19	64.54
-18	61.62
-17	58.66

Temperature (°C)	Heater (kOhms)
-16	55.95
-15	53.99
-14	50.90
-13	48.66
-12	46.48
-11	44.41
-10	42.45
-9	40.56
-8	38.76
-7	37.05
-6	35.48
-5	33.89
-4	32.43
-3	31.04
-2	29.72
-1	28.47
0	27.28
1	26.13
2	25.03
3	23.09
4	22.09
5	22.05
6	21.15
7	20.20
8	19.48
9	18.70
10	17.98
11	17.24
12	16.55
13	15.90
14	15.28
15	14.68
16	14.12
17	13.57
18	13.08
19	12.58
20	12.09
21	11.83
22	11.20
23	10.78
24	10.38
25	10.00

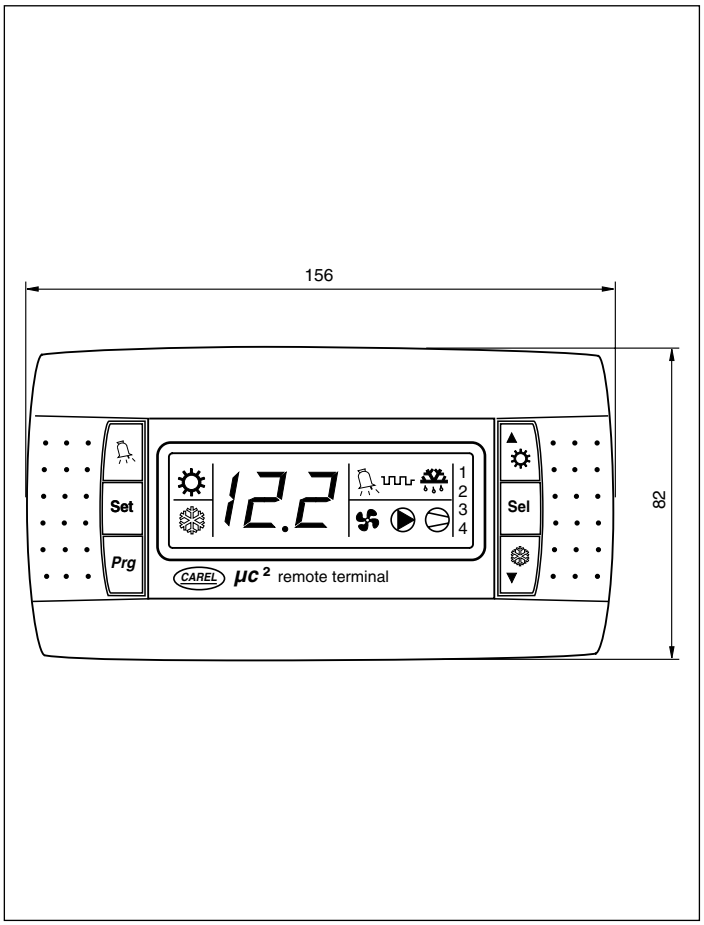
Temperature (°C)	Heater (kOhms)
26	9.63
27	9.28
28	8.94
29	8.82
30	8.31
31	6.01
32	7.72
33	7.45
34	7.19
35	6.94
36	6.69
37	6.46
38	6.24
39	6.03
40	5.82
41	5.63
42	5.43
43	5.24
44	5.08
45	4.91
46	4.74
47	4.59
48	4.44
49	4.30
50	4.16
51	4.02
52	3.80
53	3.77
54	3.65
55	3.53
56	3.42
57	3.31
58	3.21
59	3.11
60	3.02
61	2.92
62	2.83
63	2.75
64	2.66
65	2.58
66	2.51
67	2.43

Temperature (°C)	Heater (kOhms)
68	2.36
69	2.29
70	2.22
71	2.16
72	2.10
73	2.04
74	1.98
75	1.92
76	1.87
77	1.81
78	1.76
79	1.71
80	1.66
81	1.62
82	1.57
83	1.53
84	1.49
85	1.45
86	1.41
87	1.37
88	1.33
89	1.30
90	1.26
91	1.23
92	1.20
93	1.16
94	1.13
95	1.10
96	1.06
97	1.05
98	1.02
99	0.99
100	0.97
101	0.94
102	0.92
103	0.90
104	0.87
105	0.85
106	0.83
107	0.81
108	0.79
109	0.77

Accessories

Remote terminal YLCA/YLHA 40, 50, 60 and 80

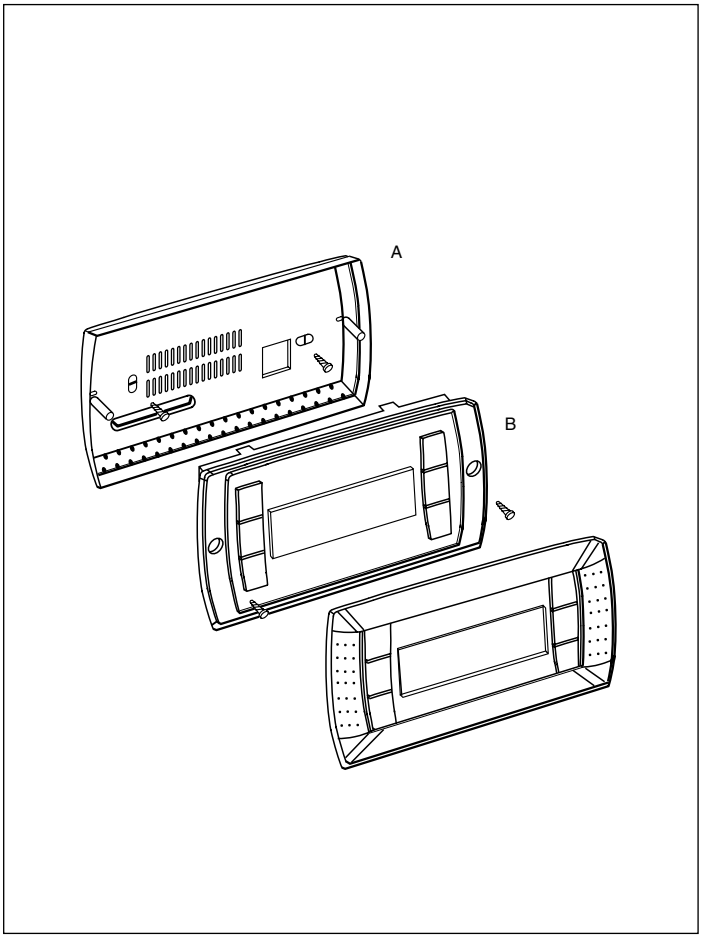
This accessory allows remote control and supervision of the air conditioning unit (up to 1040 m.). Functions are the same as the standard control panel keyboard. This remote terminal is compatible with said electric panel keyboard, and the air conditioning unit can be accessed from both devices. For this application, it must be connected to the system by means of the *RS485 serial line connection* accessory.



Wall-mounting

For wall-mounting, the rear support (A) must be fastened to a standard three-switch modular box.

- Fasten the rear of the casing to the box by means of the two round head screws.
- Connect the telephone cable.
- Place the control unit on the rear casing and fasten by means of the two flat head screws (B).
- Fasten the front panel by applying slight pressure.



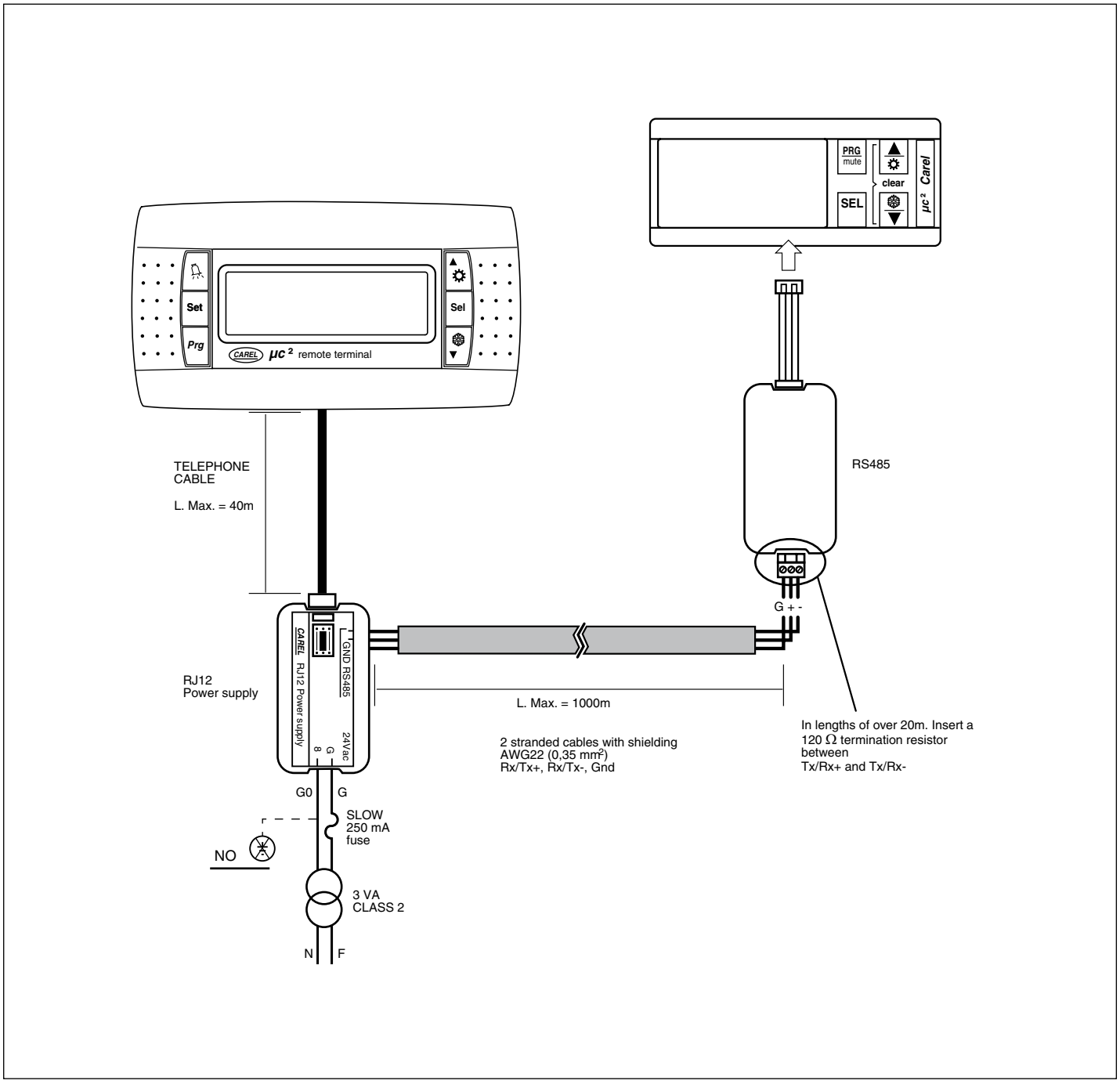
Wiring

Connect the RS485 serial device (separate accessory) to the RJ12 *power supply* outlet (included with the remote terminal) and to the electric panel keyboard supervising connection, using shielded cable. Power terminals G-G0 by means of a transformer and a 250mAT fuse as per the diagram enclosed. Carry out connection between power supply RJ12 and the remote terminal, using the telephone cable supplied (80 cms.). This cable can be replaced by a longer cable of up to a maximum of 40 m.

Attention:

- Use safety transformers only (3VA, class 2).
- For safety purposes, a 250mA slow fuse should be inserted in series with the G terminal.
- Do not ground transformer secondary.

Maximum distance to RS485	*1 km. (insert a 120-ohm 1/4W resistor in RS485)*
Speed	*19.200 bauds*
Cable characteristics	*2 braided cables with shielding*
Cable section	*AWG22 (0.35 mm²)*
Capacity per metre	*>90pF/m (for example, BELDEN 8761-8762 cable)*



Installation

No configuration is necessary for the remote terminal to be operative because the terminal operates whatever the control serial direction might be (can be selected by means of parameter H10). At start-up, the screen will display the control version. After 4 seconds, all symbols will be displayed. Should the connection to the RS485 not be correct, or the control unit is set to *OFF*, the message *offline* is displayed.

Info mode

Pressing the up, down and sel keys simultaneously for over 6 seconds, four lines are displayed with information on the system and communications.

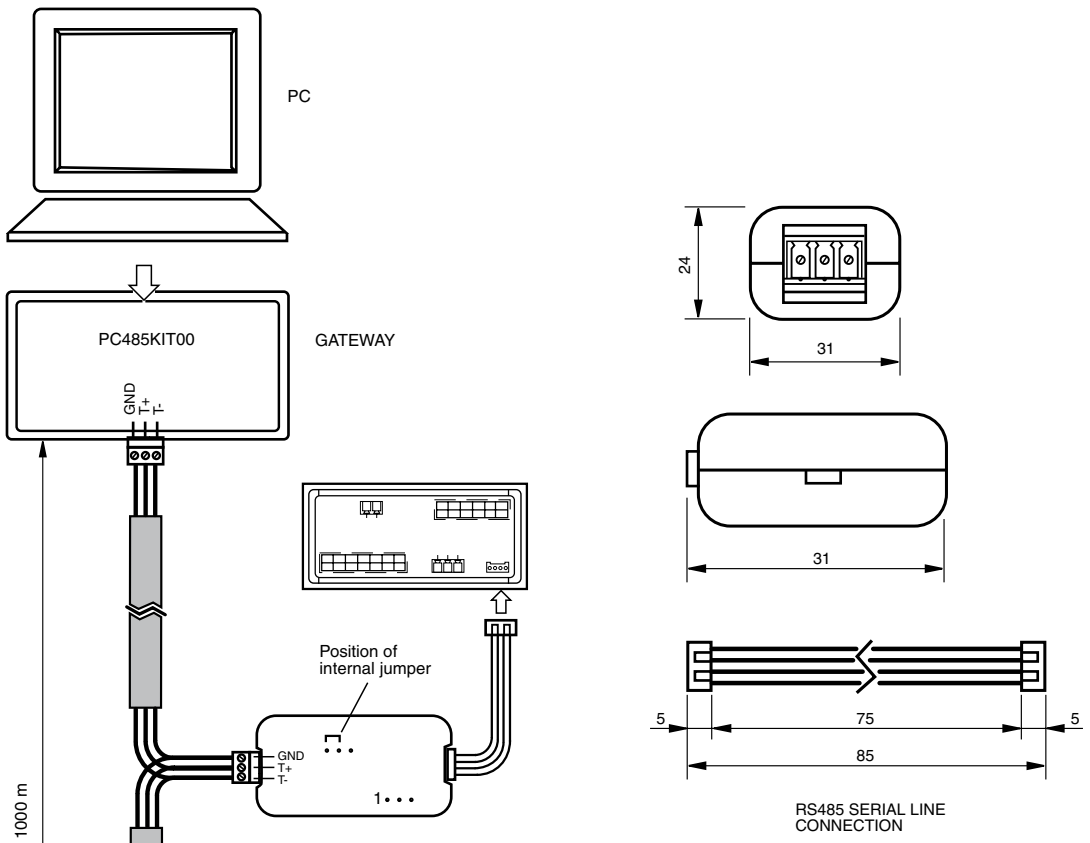
Line 1	*Terminal version*
Line 2	*Control unit version*
Line 3	*Control supervision direction*
Line 4	*Error percentage between the terminal and the control unit*

Connecting serial line RS485

This accessory allows connecting the air conditioning unit to a serial line RS485 supervision network. It must also be used to install the remote terminal accessory.

Mounting

Connect the accessory to the four-pole socket base at the lower right angle of the module with display and keyboard. Use the 4-cable connector supplied. Connect to the supervising system as indicated in the diagram below.
The series should be terminated by connecting a 120-ohm 1/4W resistor between terminals TxRx+ and TtxRx-.



Attention:

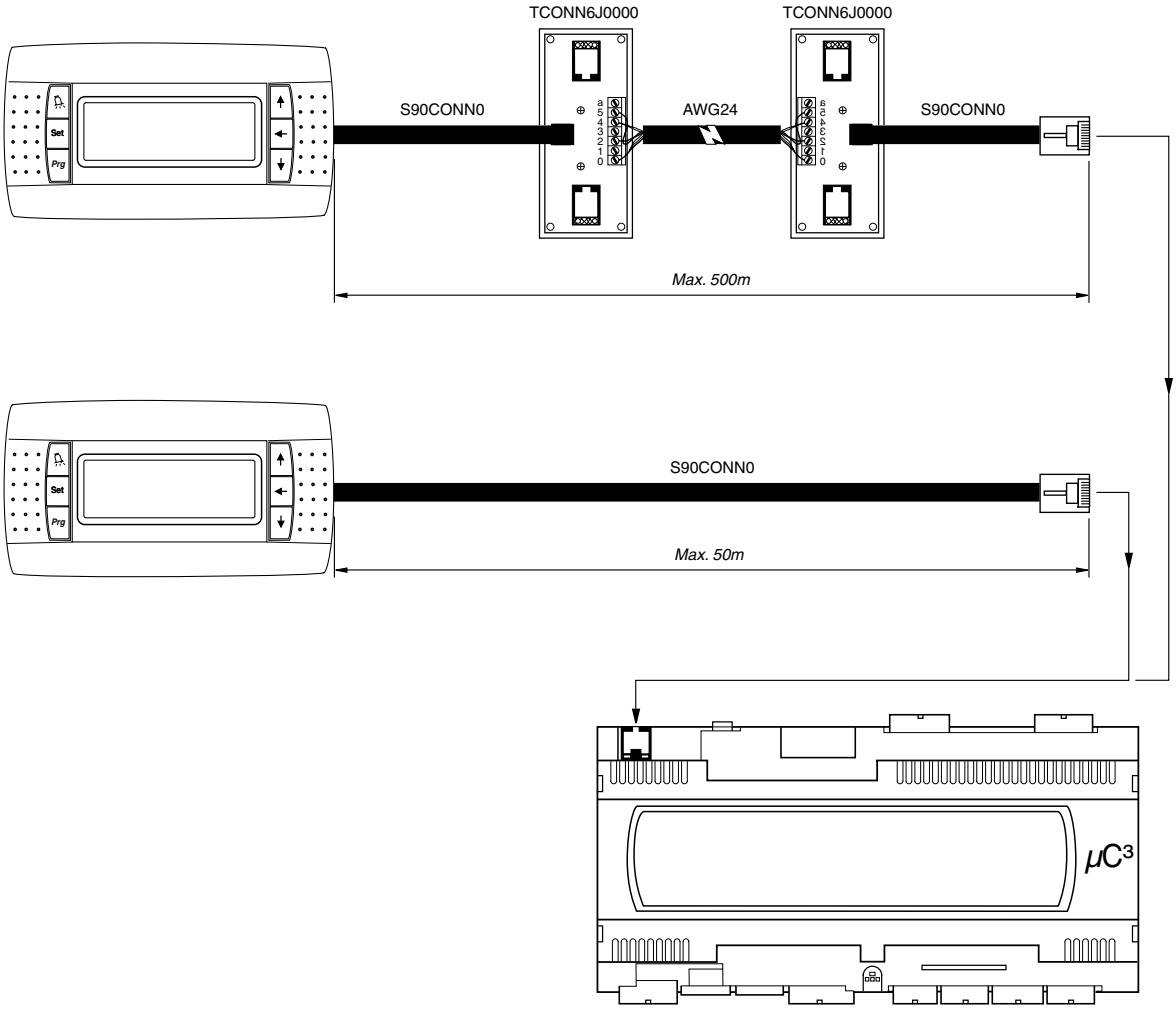
- *Secure the device inside the electric panel so as to avoid accidental disconnection.*
- *Interconnect after having turned power supply off first.*
- *Keep the serial connection cables away from the power supply cables.*

Maximum distance supervision	*1000 m. (insert a 120-ohm 1/4W resistor in the last RS485 connection)*
Speed	*19.200 bauds*
Cable characteristics	*2 braided cables with shielding*
Cable section	*AWG22 (0.35 mm²)*

Remote control unit YLCA/YLHA 100, 120 and 150

The display can be located at a distance of 50 m. from the µC3 controller by using telephone cable.
This distance can be increased to 500 m. by using two pair braided and shielded AWG24 cable. This cable should be inserted between two TCONN6J000 connectors (accessory) which, at the same time, are connected to two S90CONN0 telephone cables (accessory). See diagram below.

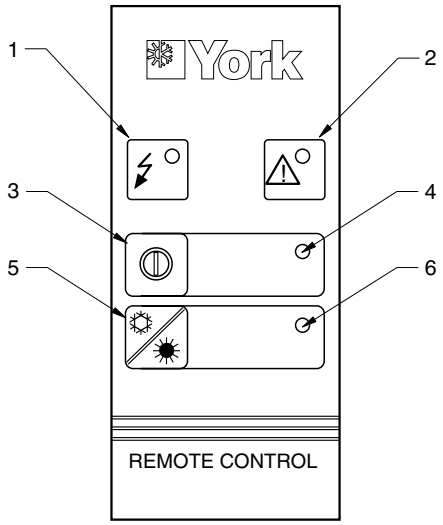
Connection of terminal with telephone cable and two pair braided and shielded cable



Remote control unit

Wall-mounted, with keys for COOL/HEAT and ON/OFF functions. Includes power supply, alarm and COOL/HEAT LEDs.

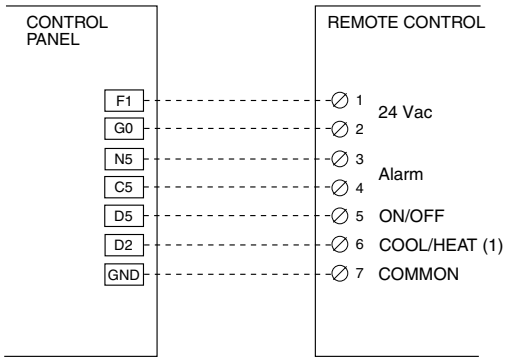
1- Power supply LED
2- Alarm LED
3- ON/OFF selection key
4- Unit ON LED
5- COOL/HEAT selection key
6- LED ON in heat function / LED OFF in cool function



- The remote control unit can be located at a maximum distance of 50 m.
- Minimum cable section should be 0.35 mm².
- Avoid extending control cables near power cables.

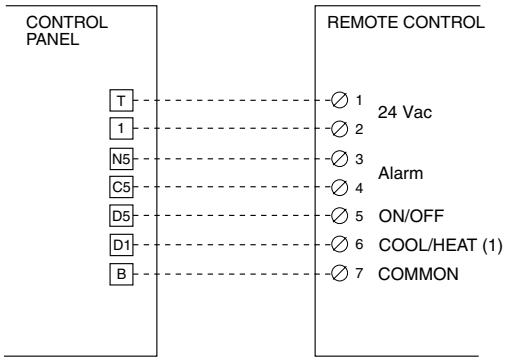
Connection with control panel YLCA/YLHA 40

Prior to installation, give value 1 to parameters H6 and H7.



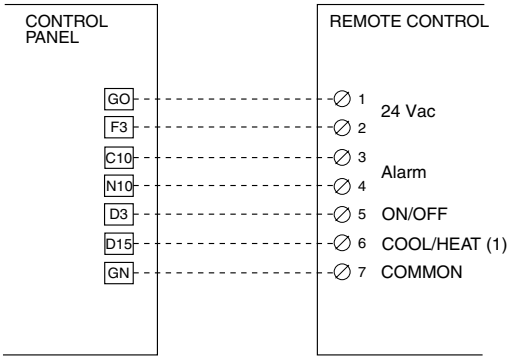
(1) On heat pump units only

Connection with control panel YLCA/YLHA 50, 60 and 80
Prior to installation, give value 1 to parameters H6 and H7.



(1) On heat pump units only

Connection with control panel YLCA/YLHA 100, 120 and 150
Prior to installation, validate cool/heat and ON/OFF inputs in menu "H", unit configuration, giving them a value of "Y".

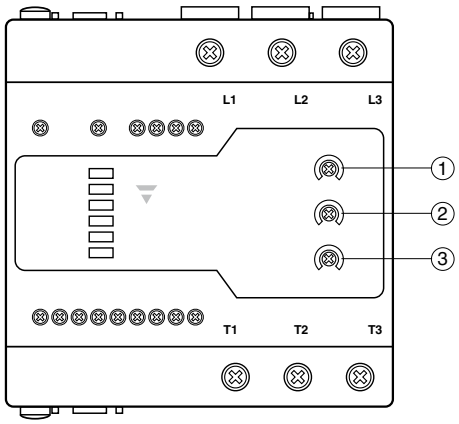


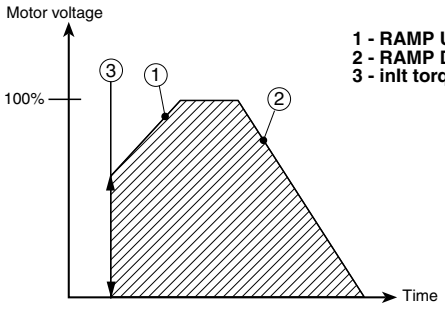
(1) On heat pump units only

Soft Start

The RSHR4032CV38, which is specific for Scroll compressors, is equipped with CA semiconductors for soft starts of the motor. Although it also protects the unit against a failure of phase F3 and inverse rotational direction, these protection devices are standard and complete (protection by failure of F1, F2 and F3) in the unit control system by means of a control relay of specific phases.

Starter adjustment must be made by means of the front pressure meters, and in accordance with the values indicated below:





1 - RAMP UP = 0,8 sec
2 - RAMP DOWN = 0 sec
3 - inIt torque = 60%

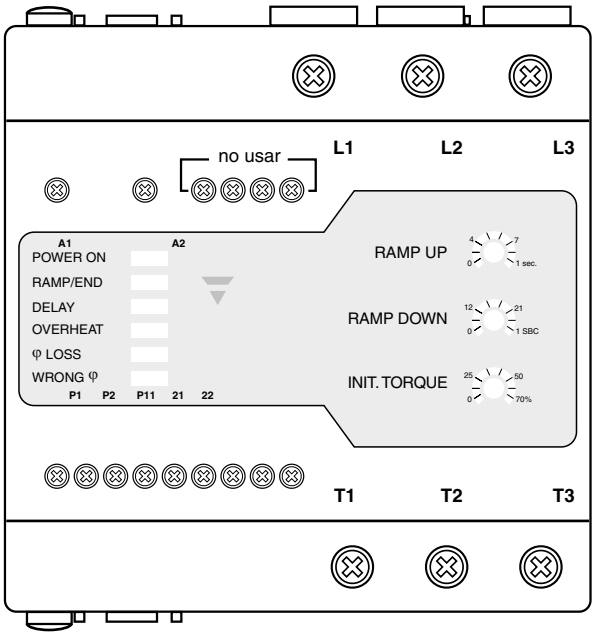
① Upgrading ramp up to 10 s: time from null charge voltage to full charge voltage.

② Downgrading ramp to 30s: time from full charge voltage to null charge voltage.

③ Initial torque 0 to 70% of voltage in starting upgrading ramp operation.

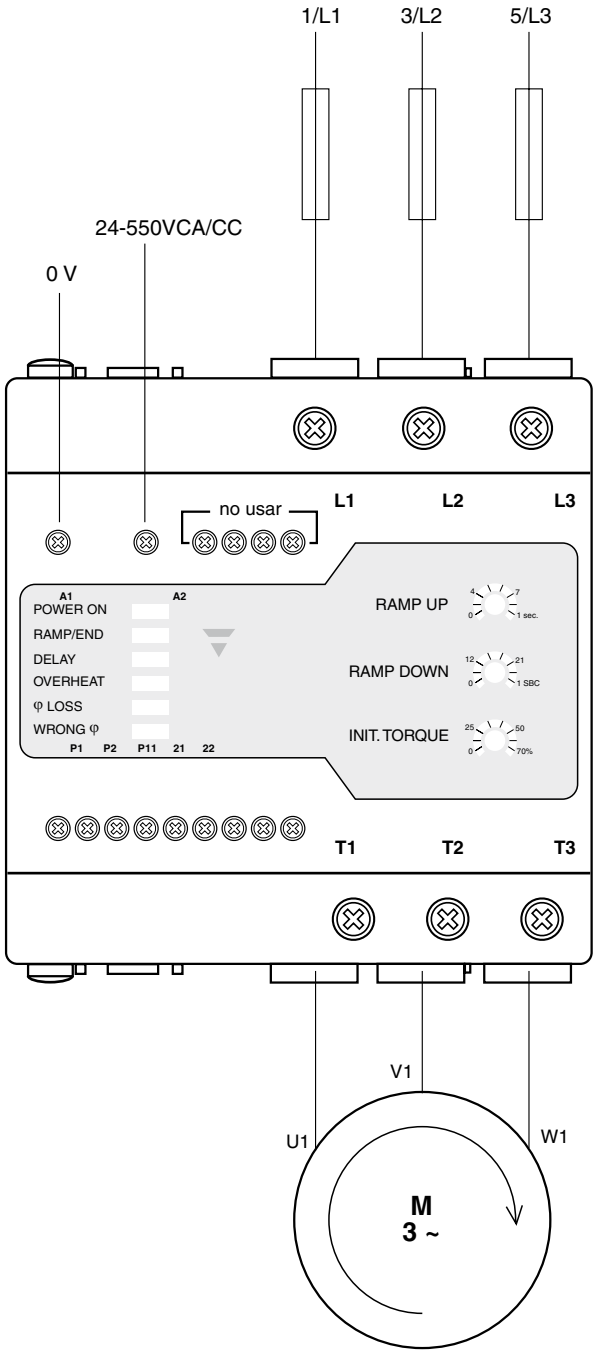
MAXIMUM OUTDOOR TEMPERATURE: 50 °C

Status LED



- Power supply connected **GREEN LED PERMANENT**
- Ramp **YELLOW LED FLASHING**
- End ramp **YELLOW LED PERMANENT**
- Starter overheat alarm, **RED LED FLASHING** (during operation)
- Motor overheat alarm (if a PTC probe is installed) **RED LED PERMANENT**
- Inverse rotation alarm, **RED LED FLASHING** (during installation)
- Phase loss alarm (phase 3 only) **RED LED PERMANENT** A 2HZ

Electrical interconnection



A1, A2: Control input
P1, P2: PTC input (if installed)
11-22: Alarms (NC). Must be connected in series to the phase relay contact included in the unit.

Operating diagram

Diagram 1a: Normal operation

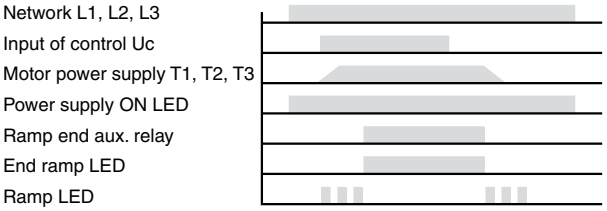


Diagram 2a: Unit overheat alarm

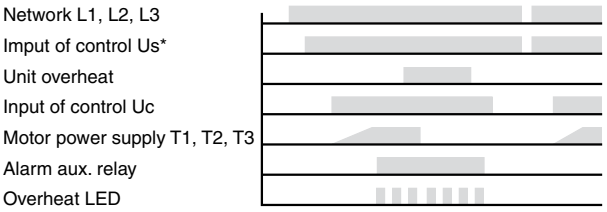


Diagram 2c: Incorrect sequence of phases

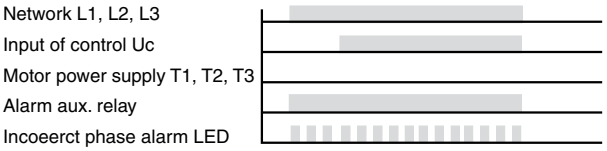


Diagram 2e: Phase loss in power supply

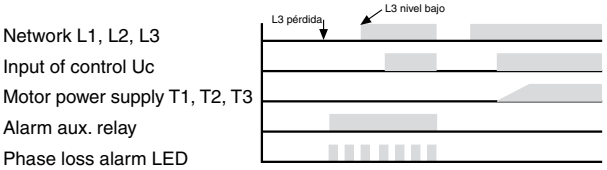


Diagram 2g: Phase loss in operation

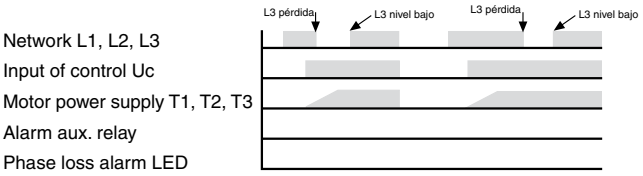
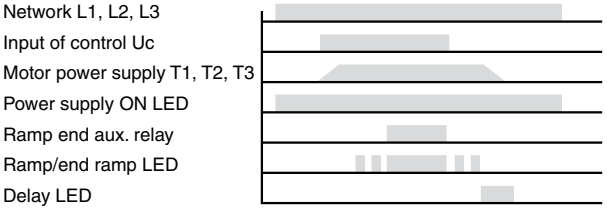


Diagram 3a: Normal operation of models RSHR.. V38



All data subject to change without notice.

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